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ABSTRACT

This multidisciplinary unit is designed to increase familiarity with various types of ships and purposes for different varieties of marine vessels. It seeks to increase familiarity with routes of ocean shipping and the effect of ocean conditions such as currents upon shipping route patterns. A discussion treats the uses of various navigation guides such as channel markers and buoys. The unit uses whole class instruction as well as individual projects. Field trip ideas are included. (RE)

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ED164353

Northern New England Marine Education Project

College of Education
University of Maine at Orono
Orono, Maine

U.S. DEPARTMENT OF HEALTH,
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John W. Butzow

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SHIPPING, SHIPS AND WATERWAYS
A Marine Education Infusion Unit

A Maine - New Hampshire Sea Grant Project

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The College of Education, University of Maine

SE 026 342

Northern New England Marine Education Project

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Acknowledgements

This unit was prepared and trial tested in schools in Maine and New Hampshire during spring 1978. Each of the units in this Marine Education Program were trial tested in a minimum of five classrooms and were revised as a result of suggestions by the cooperating teachers. Parts of these units and much of our working philosophy was derived from project C.O.A.S.T. developed at the University of Delaware and we gratefully acknowledge the leadership of Dr. Robert Stegner, director of project C.O.A.S.T. These materials were trial tested under the supervision of former assistant director Dr. Les Picker and were written by graduate students in education at the University of Maine (Orono) and cooperating teachers in the schools of Union, Maine; Freeport, Maine; and Hampton, New Hampshire. We call these units - trial units - because we hope you will try them in your classroom and modify them to suit your situation.

John W. Butzow
Project Director
January 1979

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NORTHERN NEW ENGLAND MARINE EDUCATION PROJECT

ANNOTATED LIST OF INFUSION UNITS: K-8

Trial Edition A

- K Clams and Other Critters: a unit on shells (living and non-living), includes crafts, science, language arts, home economics, math and other areas (Butzow and Jones)
- K + 1 Marine Art: art and craft activities to be used in many subject areas (Picker)
- 2 The Aquarium: revolves around a freshwater aquarium setup. Language arts, math, science, art and others (Kilfoyle)
- 3 The Beaver: study of the history, economics and natural history of the beaver. Social studies, language arts, music, arts, crafts, science, math (DiSilvestro)
- 4 The Lobster: explores the economics, history, biology, literature of the lobster. Home economics, art, crafts, science, social studies, literature (Kilfoyle)
- 5 Whales and Whaling: a complete study of the history, biology and economics of whales and whaling. Language arts, music, math, science, social studies, arts, crafts, industrial arts (Picker, Carlin)
- 6 Our Heritage of Ships: surveys the development of ships, with emphasis on New England. Science, art, music, crafts, literature, language arts, social studies (Glueck, Butzow)
- 7 Ships, Shipping and Waterways: explores ships and seaways today, with emphasis on New England. Social studies with excursions into science, arts (Glueck, Butzow)
- 8 Coastal Indians of Northern New England: three part approach to Indian studies, culminating in an "Indian Day or Evening." Independent study suggested for Part II. Language arts, library science, music, art, crafts, social studies, marine science, industrial arts (Picker, DiSilvestro)

Units are available from:
Northern New England Marine Education Project
Shibles Hall, College of Education
University of Maine at Orono
Orono, Maine 04469

TITLE: Shipping, Ships and Waterways

SUBJECTS: Social Studies, including excursions in science, mathematics,
language arts

CLASS PERIODS: various

AUTHORS: Glueck, 1978 with Butzow (modified Murray and Osborne)

INSTRUCTIONAL OBJECTIVES

Upon completion of this lesson plan the student should:

1. Be able to list (or name) the nine common vessels studied (passenger ships, ferryboat, cargo ship, tanker, U.S. Coast Guard ship, aircraft carrier, submarine, tugboat and fireboat) and describe how each vessel is used.
2. Explain what a shipping route is and that it is affected by ocean currents.
3. Know the uses of certain navigational guides, e.g., channel markers and buoys.
4. Describe with original drawings and/or written paragraphs any field trip experiences.

Shipping, Ships and Waterways

Overview

This unit is designed to use both whole class instruction as well as individual project work and (if possible) field trip experiences.

A suggested procedure covering three - four weeks is as follows:

- Week I** Day 1-2 Discussion with class of types of vessels and their general purposes and design. Reinforce with transparencies made from enclosed drawings
- Day 3 Assign group projects (example handout provided)
- Day 4-5 Research teams begin work, start letter writing and visit (school) library for orientation by librarian perhaps including overview of books/materials display in library on shipping materials
- Weeks II-III**
(As Desired) Research teams given some inclass time to discuss progress or share information otherwise class continues on regular topics
- Week IV** Research teams given opportunity to report to class on their work, opportunity is provided for team members to show display slides or give demonstrations. Teams may want to invite a speaker and provisions are made to conclude the unit with a field trip to visit a shipping port and/or a large vessel.

Planning and Preparations for Teaching

1. Locate a ship to be visited or other suitable field experiences and speakers. A list of suggestions is included as appendix A. A field trip activity is also suggested.
2. Order, if desired, the 35 mm color slide supplement for this unit
from: Instructional Systems Center
Shibles Hall
University of Maine at Orono
Orono, Maine 04469

A small fee for postage and handling will be charged. The use of this color slide set is helpful but not absolutely necessary in the unit. A listing of the slides is included as appendix B.

3. Prepare transparencies and/or paper copies of Figures 1 - 15. These drawings were prepared to provide pictorial details about the various ship types. A list of these figures is in appendix C.
4. Arrange with the school or local librarian to put together a display of books on ships and shipping.

A useful book for general reference for this unit which is up to date, readable, and extremely well illustrated is:

Super Boats by John Gabriel Navarra
Doubleday & Co., New York, 1977.

It is strongly suggested that a copy of this book be available to feed interests aroused by this unit. To supplement the figures, your class may enjoy using:

Looking Inside Ships Through the Ages by David Sharp
Rand McNally & Co., Chicago, 1976.

A bibliography of books and a list of instructional films is included at the end of this unit.

5. It would enhance the understanding of ship design if the class had science oriented experiences on flotation, buoyancy and water wave action. Activities to supplement the understanding of these areas could be completed in the social studies class or could be referred to the science teacher. These activities are presented as appendix D.

Additionally cooperative Music (appendix E) Math (appendix F) and Language Arts or English (appendix G) teachers may want to participate. Materials included for their use could be used in Social Studies class if you desire.

6. As the unit is started you may desire to distribute a copy of the next page which suggests possible approaches for group work.

Shipping, Ships and Waterways

Your group will study at least two of the nine common sea-going vessels. You will have four (4) weeks to complete your project. The last week of the unit will be taken up with oral presentations. You are required to:

- I. Learn the material given to you about your vessel.
- II. Find more information about your vessels by writing to various suggested agencies, travel bureaus, etc.
- III. Read stories and factual information about your vessel. Take notes, make drawings, etc. on what you read.
- IV. Collect and draw pictures of your vessels, or make models.
- V. Make illustrations labeling parts; showing size, draft and speed; demonstrating uses; etc. of your vessels.

Gather all your information and stories about your vessels. Decide how you are going to present it to the class. Suggestions are: color slides, booklet with illustrations, posters with information and drawings, models with an oral presentation and carvings.

Suggestions for groups:

Passenger ships

Contact travel bureaus

Ask about fare on vessels, does the fare include meals, activities on board, difference between 1st class and 2nd class, length of time aboard.

Call the airlines and compare the air fare with the passenger ship fare.

Collect brochures showing diagrams of various passenger ships.

Ferryboats

Call about the fares on local ferries. Ask about meals, cabins, activities etc. Find out the cost of taking an automobile, what merchandise if any it carries, what other services it provides, etc.

Cargo Ships

Find out differences among cargo ships
 Make illustrations showing general cargo freighter hold and quarters
 Demonstrate how a ship must be loaded in front of class
 Call or write Port Authorities asking how many cargo ships come in to port, countries they are from, what they carry, the expense, etc.

Oil Tankers

Gather information on size of ship, draft, capacity, etc. How many men must man the ship, how long is their sea duty, etc.
 Demonstrate to class stress on tanker in storm.
 Write a local oil port for pamphlets, material, information.

Coast Guard

Contact the Coast Guard. See if someone will speak to the class.
 Find out information on training, salary, etc.
 Find out all the various responsibilities of the Coast Guard.
 Report on interesting stories dealing with the Coast Guard.
 Find out about this vessel. How large is it, how is it equipped, how many men are on board, etc.

Naval Ships

Collect information about the various kinds of naval ships and the responsibilities.
 Contact ship building firms to see if they are building any, what size, etc. Ask about ships they have built.
 Contact the local naval recruiter for information on naval ships and availability of speakers, film or field trip experiences.

Teacher's Notes

The following pages provide written materials about ships and shipping practices and activities for use as followup. You may wish to duplicate these for distribution to groups of students or use them yourself as lecture notes and as suggestion for activities in your class or for home work.

LESSON 1 - PASSENGER SHIPS

Passenger ships, or ocean liners carry people across the oceans of the world. About 140 years ago, these became popular as a means of fast transportation between Europe and North America. Later ocean liners sailed to exotic places like the Carribean Islands and Hawaii and Japan. Over the years, these ships became progressively faster and larger; the first ocean liners were only 50 meters long, while the S. S. France (1961) is almost 315 meters long.

Passenger ships are like floating hotels with dining rooms, elevators, swimming pools, and hundreds of bedrooms. The staff includes doctors, nurses, stewards, sailors, cooks and engineers.

Ocean liner travel is declining. Travelers would rather cross the Atlantic Ocean, for instance in 7 hours by airplane than in $3\frac{1}{2}$ days by ship. There still are some modern ocean liners which make special vacation cruises to tropical islands. Some ocean liners are being permanently moored and turned into floating hotels and museums.

The last ocean liner which sails from Europe to the United States is the "Queen Elizabeth II" or "QE2". Slide 3.

Name of Ship	Year Built	Length	Weight	Speed KM/Hr	Knots	Fate
Queen Mary	1934	310.3M	73680T	58.7	31.7	Hotel & Museum
Queen Eliz.(I)	1940	314.25M	75891T	58.3	31.5	School-ship, burned & sank
United States	1952	297.0M	48370T	70.3	38.0	For Sale
France	1961	315.5M	59862T	55.5	30.0	Sold for Hotel
QE2	1969	297.0M	57141T	55.5	30.0	In Service

*A knot, or one nautical mile per hour, is an international unit equal to 6,076 feet, usually rounded off to 6,080 feet. The number of knots $\times 1.852$ = the number of kilometers per hour.

LESSON 2 - FERRYBOATS

Ferryboats carry people, automobiles, trucks, and merchandise across rivers, harbors and bays. Some ferries go out into the oceans. There are three different types of ferries that operate in Northern New England. The largest sail across the Bay of Fundy, between Yarmouth, N.S., Bar Harbor and Portland, Maine. These ships look like small ocean liners. Double-ended ferries, like the Isleboro and Vinal Haven ferries in Maine, are built with both ends the same to facilitate (help in) loading and unloading automobiles without turning around. The Eastport, Maine ferry to Deer Isle, N. B., is a barge pushed by a small power-boat. All these ferries have a place for automobiles and passengers. Sixty years ago, ferries in Maine and New Hampshire used to carry railroad cars. Only a few ferries still do in the U.S.A.

Look at slides of "Caribe" (Slide 4), "Bluenose" (Slide 5), Eastport ferry (Slide 6), and Isleboro ferry (Slide 7). Compare features, stressing safety in rough weather, speed and size.

LESSON 3 - CARGO SHIPS

The majority of vessels sailing the oceans today are cargo ships, also called freighters or merchant ships. The varieties of these vessels are numerous, but they can be classified by the manner in which they load or carry cargo.

The general cargo freighter (slide 8) is divided into holds where different types of cargoes are sorted by weight or content for the voyage. After loading, cargo is tied down so it will not shift position in rough seas. Shifting cargo can sink a vessel very quickly. Above each hold is a series of cranes or booms which lift the cargo into or out of the ship. The pilothouse and crew quarters are located amidships (in the center of the vessel). The engineroom is located either below this structure or just behind it. The propeller and rudder are in the very rear of the ship. General cargo freighters must be loaded and unloaded piece by piece. This is very time consuming and expensive.

Bulk carriers (Slide 9) hold cargoes which would not be economical to package for shipment, like grain, sugar, iron ore, or coal. These ships have large bins built into them and the cargo is poured or dumped in. These bins are unloaded with higher power shovels or vacuum hoses which suck the grain or sugar up.

Another special type of cargo ship is the container vessel (Slide 10). The cargo is pre-packaged into metal containers which have truck wheels beneath them. They can be driven like tractor-trailers to the docks where cranes lift the containers off the docks, and load them aboard the ship, still packaged (Slide 11). These can be stored in the hold or on deck, and stacked on top of each other. When the ship

arrives at its destination, the cargo can be delivered still in the same container. Since each container can hold many pieces of freight, this is a very quick way to deliver freight.

A similar type of ship has been built for objects which would be too large to transfer from one ship to another. Large and heavy objects (like parts for nuclear reactors) are loaded on barges and towed to the bigger ship for the ocean voyage. The end of the bigger ship opens up, and the barge is pulled inside without unloading. This is called LASH or Lighter Aboard Ship (Slide 12). When the ocean voyage is completed, the barge is removed from the bigger ship and towed to its destination by tugboats.

LESSON 4 - OIL TANKERS

Oil tankers are designed to carry large amounts of crude oil and petroleum products.

Small tankers are used to deliver supplies of oil products as fuels to river and coastal communities. They are not very large or deep, so they have little problem navigating in shallow water.

(Slide 13)

Ocean going tankers can carry many times the same amount of cargo held in river tankers. Super-tankers are ocean going ships which can weigh between 300,000 tons and half a million tons, (Slides 14, 15), and carry over 500,000 barrels of crude oil. One barrel equals 42 gallons. These ships are sometimes called Very Large Crude Carriers, or VLCC's. Vessels this size are too large to fit through the Panama and Suez Canals, and must sail around the Cape of Good Hope (Africa) and Cape Horn (South America). Super-tankers move very slowly and may be at sea for over six months on one voyage. Many new VLCC's are equipped with fine libraries and swimming pools. On the "Globtik Tokyo" men use bicycles to travel from one end of the ship to the other. Because the cargo these ships carry burns so easily there is always the danger of explosions and fire. Also, as these VLCC's get longer, they become more prone to breaking apart in rough seas, spilling their cargoes and causing vast oil pollution problems (Slide 16). Larger and larger ships are being built because the greater the amount of oil in a single shipment, the lower the shipping cost per barrel. Since the new super-tankers carry a heavier load than other ships, they have a deeper draft. Draft is the distance from the water level to the bottom of the ship.

This creates a problem because very few ports are deep enough to handle ships with more than 16 meter draft. Super-tankers may have as much as a 26 meter draft. At present, most super-tankers must either transfer their oil to barges and smaller tankers or unload at an offshore terminal from which the oil is piped to a refinery.

When a tanker is fully loaded, it sits low in the water. In rough seas, waves sometimes crash over the deck. For this reason two catwalks are built so that crewmen can travel safely from one end of the ship to the other. After the ship is unloaded, the cargo tanks are cleaned so they can be filled with sea water (clean ballast) to make the ship more stable. The cleaning is done by flushing the tanks with sea water to remove the leftover crude oil. The dirty sea water (dirty ballast) is then pumped into a holding tank so that the oil and water can separate. After the oil and water have separated, the water is dumped back into the ocean and the oil left in the holding tank is saved. As the tanker approaches the port, the clean ballast is dumped to make room for another cargo of oil.

Most of a modern tanker is cargo hold. The crew's quarters, engine room and wheelhouse are over the stern of the ship. Until recently, a tanker's wheelhouse was located in the center of the ship. This used up a lot of space where cargo could be held and ships are no longer built like this.

Due to the increasing demand for crude oil products - gasoline, heating oil, raw materials for plastic manufacture and other uses - tankers are becoming more numerous. At present they comprise about 60% of the world's total shipping tonnage.

LESSON 5 - THE COAST GUARD

The United States Coast Guard is not part of the U.S. Navy. The Coast Guard is responsible for setting the traffic rules for water travel in U.S. territory at sea, on rivers and lakes. It maintains navigational aides, such as buoys and lighthouses, (Slide 17), and charts the proper channels of navigation for ship captains to use without danger of collision with rocks or other ships. When a ship does have a collision, the Coast Guard is partly responsible to find out how the accident happened and how it can be prevented in the future. If a ship is in danger of sinking or sinks, the Coast Guard rushes to the scene and rescues survivors (Slide 18). The Coast Guard watches the American shores to prevent possible smuggling and unauthorized entrance into U.S. territory from the sea.

The territorial limits of the United States are 3 miles for all ships and 200 miles for foreign fishing ships. Before any ship can enter U.S. ports it must have permission from the Coast Guard, stating that the vessel has passed certain safety requirements. Ships that dump wastes into the ocean or leak oil are not permitted to enter U.S. waters. If a ship is found to be doing this after it enters U.S. territory, the Coast Guard may arrest the Captain of the vessel and heavily fine the ship's owners. It is a very important responsibility to protect the ocean and American shores from abuse by U.S. and foreign ships.

Because so many things can happen to ships at sea without warning, the Coast Guard patrols the sea lanes with ships from other countries watching out for wreckage, lifeboats, and icebergs. Coast Guard ships are identified by a large orange stripe on both sides of the vessel.

LESSON 6 - NAVAL SHIPS

The Navy protects the United States on the ocean. Naval ships either transport soldiers, keeps them supplied with food and supplies, or protects them. Many Naval vessels also do oceanographic work such as sampling and photographing the sea floor, far below depths which can be safely visited by man.

The newest defense vessels of the U.S. Navy are aircraft carriers and nuclear submarines. Aircraft carriers are huge floating landing strips which are capable of fueling, landing and launching fighter planes. Sometimes aircraft carriers are called "flat-tops" because of their landing areas (Slide 19). Nuclear submarines (Slide 20) carry weapons which can strike enemy targets around the world should the United States be attacked by another country. Submarines are also capable of sinking enemy ships at sea without surfacing. Nuclear submarines are able to stay submerged for over $\frac{1}{2}$ year on a voyage. The Navy also has some research submarines which can take men to the very deepest known areas of the world's oceans. The deepest dive ever made was in the Pacific Ocean, at a depth of over 8 miles by the bathysphere (deep diving submarine) "Trieste." (Slide 21)

During peace times, Naval ships sail around the world and call at other countries to visit. Aircraft carriers have often been used to pick up returning space capsules from the ocean. It is safer for the returning astronauts to land on water which softens the impact and lacks obstructions such as mountains and cities. Many submarines in the U.S. Navy fleet were constructed at the Portsmouth Naval Shipyard in Portsmouth, New Hampshire.

LESSON 7 - HARBOR BOATS

Most ships are built to travel over the ocean. However, when they reach a harbor, they are too big to easily move around. Instead, they turn off their engines and are pushed by tugboats (Slide 22). Tugboats are also called tugs or towboats. They are small but powerful, and they can pull or push any big ship into a dock. Tugs that are used in harbors usually measure from 20 to 35 meters in length and their engines have up to 3,500 horsepower (hp).

Tugboats not only work in harbors but also work on rivers and lakes. They push long strings of barges loaded with cargo to river ports and lake ports. These tugs, which have engines with up to 6,600 horsepower, are even more powerful than those used in seaports. More powerful tugs are necessary here due to the long distance the barges must be pushed. This method of cargo transport is very economical since individual barges can be disconnected and dropped off at various destinations. Tugs and barges have a very shallow draft, making them suitable for many water areas not accessible to larger ships (Slide 23). A few barges are self-powered. (Slide 21 - a powered barge on Cape Cod Canal)

For safety, harbors also have fireboats. When there is a fire on a boat, fireboats can go where fire trucks cannot. Fireboats are tugboats that have hoses and water pumps. Water for fighting the fire is pumped from the body of water on which they are located. In any harbor, fireboats are just as important as tugboats. Modern fireboats are about 40 meters long, with pumping capacities of up to 500,000 litres per minute.

LESSON 8 - SEAWAYS AND THE RULES OF THE SEA

A seaway is the path a vessel takes through a waterway. It is usually the shortest distance between two ports. Many ships use the seaways. To prevent accidents, there are rules for navigators to follow. The rules are like automobile traffic rules, except they are for ships on water instead of for cars on land.

A seaway can be broadly defined as a route which ships take in going from one point to another. This can be anything from a canal or river to a standard path of travel across an ocean. Before steam power, ships depended on wind and water currents for their power. In order to make the most of the charted currents and winds, they relied on standardized routes. Today's high-powered ships do not need the winds and currents. For them, the shortest route is the fastest, so the shortest routes have been charted, taking into account intervening land masses, ice-infested waters and regions of continuously bad weather. Because so many ships use the charted routes, an international set of rules to which all ships adhere is necessary.

All ships use sound, light and radio to warn of their approach and to be warned of the position of other ships or topographic dangers such as shallow water or a rocky coast. For instance, when visibility is low, a ship blows its horn in long, steady blasts. A ship in distress uses four short horn blasts or a Morse Code SOS on the wireless (three shorts, three longs, three shorts). In addition to internationally understood signals between ships, there are buoys. Buoys are floating objects moored to the bottom of a waterway. They are the traffic signs of the water. By their color, shape, number, and light, buoys tell the navigator how he can avoid hazards and follow a proper course.

STUDENT ACTIVITIES

Passenger Ships

1. By visiting a travel bureau, you may wish to compare fares for first class ocean voyages and plane travel. Also compare the time in crossing speed, activities, food served, number of people carried.
2. Page through back-issues of National Geographic or Time Magazine, dating from 1955 to the present. Graph the number of ads for ocean-liner voyages, the vessels by name, the companies by name. The highest point of trans-Atlantic ocean travel was 1957, and then a steady decline occurred. The "Queens" retired by 1968, the "United States" by 1969, and the "France" by 1975.
3. Write to:

U.S. Customs Service	Propeller Club
312 Fore Street	10 Dana Street
Portland, Maine	Portland, Maine

These foreign consulates in Portland: Norwegian, Italian, French, Paramanian, Swedish.

Ferries:

1. Collect ferry schedules from around the State of Maine and count the ferry operations shown on State maps. Where do they sail between? What distances? What size communities do they serve? Do ferries operate where bridges cannot be built?
2. Write to:

"Caribe"	Casco Bay Lines
Portland International Ferry	Custom House Wharf
Portland, Maine 04101	Portland, Maine
Transportation Services Dept.	"M.V. Bluenose"
Bureau of Planning	C.N. International Ferry
Department of Transportation	Bar Harbor, Maine
Augusta, Maine 04330	
	Maine State Ferry Service
	Rockland, Maine 04841

3. Take a trip on any of the Maine coastal ferries and give a written or oral report concerning the places you traveled between, the dock facilities, types of vehicles carried, your fare, animals seen, buoys seen, the name and structure of the ship, other ships seen, the length of the voyage in distance and time. Divide the distance acrossed by the time it took to determine the speed of crossing.
How is your ferry powered?

Freighter Activities:

1. Build a model of any type of freighter you have studied. Plastic kits are available, but you might use wood or cardboard. A 2" x 4" board makes an excellent hull to start with.
2. Build a working L.A.S.H. or container ship system using cardboard boxes.
3. Write to:

American Bureau of Shipping 42 Broad Street New York, NY 10004	National Cargo Bureau 131 State Street Boston, MA 02109
American Inst. of Merchant Shipping 1632 K Street, N.W. Washington, D.C. 20006	(Stevedores) I.T.O. Corp. of New England 242 St. John Street Portland, Maine
Transportation Institute 923 15th St., N.W. Washington, D.C. 20005	National Maritime Council P.O. Box 7345 Washington, D.C. 20044
4. Collect newspaper ads, articles, clippings pertaining to freighter service.
5. Visit and report on the Maine State Pier, Portland.

SOCIAL STUDIES PROJECTS

Tankers

1. Activities: Map a tanker voyage from Saudi Arabia to Portland, Me., using the Suez Canal; without the Suez Canal.
2. Registries: If the class takes a field trip, observe the name of the port of registry on the stern of the ship. The port of registry is where the ship is licensed from, and the port's licensing agency requires certain safety features aboard the vessel. United States registry requires many expensive safety devices, whereas other countries do not. Many ships are registered where it is cheaper and run the higher risk of an accident.

Read: Supership by Noel Mosert, 1974
Oil & Water by Edward Cowan, 1968
Disaster by Oil by Jeffrey Potter, 1973

"World's Largest Spill" - "Riding with the Tankers"
 National Geographic, July, 1978

3. Ship's Insignia Poster: Texaco International Marine Sales
 135 East 42nd Street
 New York 10017

4. Write to:

Portland Harbor Pollution
 Abatement Committee
 40 Commercial Street
 Portland, Maine

Portland Chevron Oil Co.
 175 Front Street
 South Portland, Maine

American Oil Co.
 1 Clark Road
 South Portland, Maine

Getty Oil Co.
 7 Main Street Rear
 South Portland, Maine

Golten Ship Repair, Inc.
 400 Commercial Street
 Portland, Maine

Portland Pipeline Co.
 335 Forest Avenue
 Portland, Maine 04101

Cities Service Oil Co.
 17 Main Street
 South Portland, Maine

Gulf Oil Corp.
 601 Danforth Street
 Portland, Maine

Humble Oil & Refining Co.
1 Lincoln Street
South Portland, Maine

Shell Oil Co.
5 Central Avenue
South Portland, Maine

Texaco, Inc.
102 Mechanic Street
South Portland, Maine

Mobil Oil Corp.
48 Main Street
South Portland, Maine

BP Oil Corp.
59 Main Street
South Portland, Maine

Sun Oil Company
93 Kensington Street
Portland, Maine

Coast Guard Activities:

Send for free Coast Guard Literature for discussion in class.

Suggested pamphlets are:

"Federal Requirements for Recreational Boats" CG-290

"A Pocket Guide for Visual Distress Signals" CG-152

"Stopping Marine Pollution"

"Courtesy Examination for Motorboats" CG-2902 (Aux - 204)

"Don't Make Waves" by State Farm Insurance Co. Bloomington, Ill.
(FA 7 - 674.2)

"Coast Guard History" CG-213

"Historic Lighthouses" (CG # unknown)

Write to or visit: U.S. Coast Guard
Captain of the Port
259 High Street
South Portland, Maine

NAVAL HISTORY ACTIVITY

Project: A time line or wall mural - one wall of the classroom has brown poster paper extended along it. One extreme end should be dated for 1776, while the other should be dated as the current year. Intervals of time can be marked along the length. Have the children research U.S. naval ships throughout history and either draw or collage representations of vessels.

A Guideline:

- 1776 "The Turtle" (first submarine)
A privateer vessel (sloop)
- 1812 "U.S.S. Constitution" and "Constellation"; sailing frigates
- 1814 Multi-decked ships of the line with cannon
- 1820 Low-sided ships with gun ports
- 1831 Short-single decked revenue cutters; sail powered
- 1859 "Kearsarge" Paddle wheel and sail powered together with guns
- 1862 Iron hulled "Monitor" and "Merrimac"
- Civil War Union and Confederate Ironclads; Submarine "Hunley"
- 1870's Decline of wooden ships - increase of "Monitor" types
- 1880's Steel and iron battleships; the "Great White Fleet" of the Spanish American War
- 1900 Decline of "Monitor" types; rise of battleships and transports
- 1920 Small U.S. submarines; "S-51", "Squalers" Aircraft, blimps dirigibles
- 1935 Early aircraft carriers, "U.S.S. Longley"; largest battleship
- 1940 Transports; Aircraft Carriers, larger submarines; supply ships; cruisers; destroyers
- 1950 Decline of battleships; decline of blimps; rise of submarines; cruisers; destroyers
- 1960 "Nautilus," nuclear subs, nuclear aircraft carriers, rise of jet planes
- 1970's Guided missile frigates, subs; aircraft carriers; exploration and oceanographic vessels, bathyspheres

HARBOR BOATS ACTIVITIES

1. Write to:

Portland Pilots, Inc.
42 Commercial Street
Portland, Maine

Central Wharf Towboat Co., Inc.
72 Commercial Street
Portland, Maine

Harbor Master
Maine State Pier
Portland, Maine

Eastern Maine Towage Co.
Marshall Wharf
Belfast, Maine 04915

Penobscot Bay and River
Pilots Association
P.O. Box 97
Belfast, Maine 04915

Boston Fuel Transportation, Inc.
446 Commercial Street
Portland, Maine

Maine Dept. of Transportation
Bureau of Waterways
40 Commercial Street
Portland, Maine

2. Make a listing of all harbor service craft in your area. Try to provide drawings or photographs of each vessel type.
3. Contact the Harbor Master; Mr. Dan Rich; Searsport, Maine 04974

OTHER SUGGESTED CLASSROOM ACTIVITIES

Bulletin Board Display

Make a display entitled "Ships and Waterways." Display the ship pictures brought in by the students along with postcards, stamps, travel folders, navigational charts, pamphlets and books.

Collect Shipping Ads

Children should have no problem locating ads for various shipping services from newspapers and magazines. Notably, large circulation daily papers like the New York Times and the Boston Globe have a daily section devoted to incoming and outgoing vessels, complete with schedules of docking. If microfilm collections are available, children might be able to compare shipping pages over a period from 1900 to the present.

Travel and Holiday magazines are also good sources.

Building a Diorama

Using materials from the beach, or scrap wood, tin, cardboard, etc., children should have no trouble reproducing scenes aboard ship, at sea, in shipyards, launching, at dock, etc.

Building Models

There are numerous plastic kits available for naval vessels, sailing ships, merchant ships, liners, etc.

Book Reports

Utilizing either the bibliography in the unit or their own sources, children can find numerous literary sources.

APPENDIX A

Where to Locate Ships and How to Visit Them

Passenger Ships

The "S.S. Maine," training vessel of Maine Maritime Academy, Castine, Maine, was originally built as the passenger liner "S.S. President Jackson" for American President Lines. A very comprehensive tour of the vessel can be arranged by contacting the school. Maine Maritime Academy; Castine, Maine.

Ferry Boats

Maine Ferries:

Portland to Yarmouth, N.S.
Lincolnton to Isleboro
Rockland to Matinicus
Eastport to Deer Isle, N.B.

Bar Harbor to Yarmouth, N.S.
Port Clyde to Monhegan
Mount Desert Is. to Swans Is.
Stonington to Isle Au Haut

New Hampshire Ferries:

Portsmouth to Isle of Shoals

Information about ferries can be obtained from the A.L.A. and Port Authorities in New York, Quebec, San Francisco, and others.

ALA Addresses:

Manchester, N.H. 03103
865 S. Willow Street
Tel. 603-669-6378

Portland, Maine 04101
559 Forest Avenue
Tel. 207-774-9883

Ferryboat rides can be arranged on the Isleboro, Vinal Haven, Swans Island ferries. Both "Caribe" and "Bluenose" trips are too long and expensive to be practical. Barge ferries, such as from Eastport to Deer Isle, are not suitable for carrying large groups of children.

Ferry Boats (continued)

Write: State Ferry Service; Rockland, Maine 04841

Ferry memorabilia and other large collections: Penobscot Marine Museum, Searsport, Maine.

Freighters

Freighters can be observed year-round at Portland and Searsport, Maine. During the late Fall and Winter, they may be seen at Winterport, Maine. Container ships are built periodically at Bath Iron Works, Bath, Maine, and can be seen being constructed and launched by prior arrangement with the shipyard.

Freighter arrivals and departures can be learned by contacting the harbor master of the municipality.

Harbor Master, Searsport, Maine 548-2218

Harbor Master, Portland, Maine 772-8121

Tankers

The Bangor & Aroostook Railroad maintains a docking facility in Searsport Harbor for tankers and freighters. Arrangements to visit and observe tankers in port can be made through the railroad. Since tanker arrivals are not scheduled, it is wise to call the harbor master (S.S. Government) before attempting such a trip.

Harbor Master, Searsport, Maine 548-2218

B & A Railroad Docks 548-2571; 548-2421

Harbor Master, Portland, Maine 772-8121

Tankers may also be seen at Portland, Maine; Portsmouth, New Hampshire; and Boston, Massachusetts. Arrangements to visit vessels should be made with the oil company the ship serves and the vessels' officers.

Coast Guard

1. Class trip: There are numerous lighthouses along the Maine coast, few are still manned, but most are in service and readily accessible. Children can locate these on state road maps and discuss the possible reasons why the "silent sentinel" was built in that location. A coastal hydrographic map may be useful in showing sandbars, wreckage and reefs, as well as a number of other important sea lane features.

Another possible trip is to the U.S.C.G. station on Mount Desert Island, at Southwest Harbor. This should be prearranged with the Coast Guard. (207-244-5517) In Portland, contact 799-5531.

2. Class trip: Visit the Coast Guard station at Rockland, Maine. Service vessels are generally available for inspection by prior arrangement with the Commander. Nearby is a park with a rescue boat and a buoy on display.

Navy

Bath Iron Works in Bath, Maine, builds many defensive and supply vessels in the U.S. fleet. These facilities will arrange a field trip if given enough advance notice.

Tugs

Tugboats are observable year round in Portland and Belfast, Maine and Portsmouth, New Hampshire.

Eastern Maine Towage
Marshall Wharf
Belfast, Maine 04915

Central Wharf Towboat Co.
72 Commercial Street
Portland, Maine

Harbor Masters

Contact Harbor masters through city or town offices

Portland	Phillip T. O'Donnel
Bar Harbor	Lyman J. Kane
Camden	Alvah Robinson
Rockland	Herby Benner
Bath	Robert Picucci
Belfast	Frederick B. Young
Eastport	Alfred T. Trott

Harbor masters schedule arrivals of commercial ships. They may be able to provide information on which ships can be visited at each port city. They may also be able to provide lists of vessels which recently visited the port.

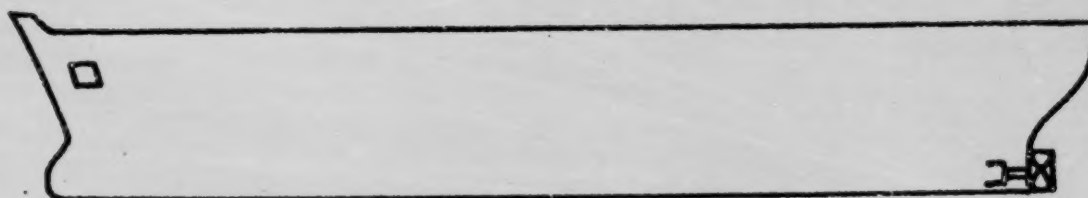
Ship Visiting Field Trip:

Junior high schoolers often pay more attention to the physical appearance of the guide conducting the ship tour than the ship itself. As a stimulus to help them remember details about the ship, you might like to duplicate the following figure for them to use as locators of exterior and interior components of the ships. Time should be spent discussing parts of ships before the trip is taken. In addition to illustrating their hull diagram (one hull for exterior features and one for a cut away view) they should be primed with such questions as:

1. How can you tell where the ship is at any time?
2. How is the ship controlled?
3. How is the ship powered? (a visit to the engine room if possible is strongly recommended)
4. How do you load and unload the ship?
5. How can you tell how many tons of cargo are aboard?
6. What happens when the ship is in a storm?
7. Where do the captain, crew, etc., sleep, eat, work, etc?
8. What are the various jobs people do aboard ship?

Included are only a few suggestions. Experience suggests a list be worked out in advance and sometimes it helps to assign specific questions to specific students.

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GUIDELINES FOR STUDENTS:

EXTERIOR

*DERRICKS, CABINS, PILOTHOUSE,
HATCHES, SMOKE STACKS,
ANCHORS, SHIP'S NAME,
WATERLINE, LIFEBOATS, FLAGS*

INTERIOR

*BOILER ROOM,
ENGINE ROOM,
CABINS,
CARGO SPACE*

APPENDIX B

Shipping, Ships and Waterways - Optional Slide Set Listing of Photographs

1. Liner row, New York City (circa 1960)
2. Liner development chart as exemplified by Cunard ships over a 100 year period.
3. Queen Elizabeth 2 loading for trans-Atlantic voyage, 1975.
- 4a. Caribe being rebuilt from Baltic Sea ferry to Maine ferry.
- 4b. Caribe in service leaving Portland enroute to Yarmouth, N.S.
5. Eastport ferry preparing to load at Deer Isle, N.B., 1977.
6. Double ended lake ferry in service on Lake Champlain, Vermont.
7. Modern general cargo freighter.
8. New bulk cargo freighter undergoing sea trials.
9. Container ship loading in Europe.
10. Transfer of a container from truck to ship.
11. L.A.S.H. vessel loaded and in service.
12. Penobscot River coastal tanker "Vincent Tibbetts" at Bucksport, Me.
13. Japanese super-tanker Aiko Maru loaded and underway.
14. Japanese tanker "Nissei Maru," largest ship in world to date (1977).
15. Liberian tanker "Argo Merchant" broken in half on Nantucket Shoals.
16. Eastern most point of United States, West Quoddy Head Light, Lubec, Maine.
17. U.S. Coast Guard cutter at speed.
18. U.S.N. nuclear Aircraft carrier.
- 19a. S.S. Dolphin, experimental deep-diving diesel submarine (1968) Portsmouth Naval Shipyard.

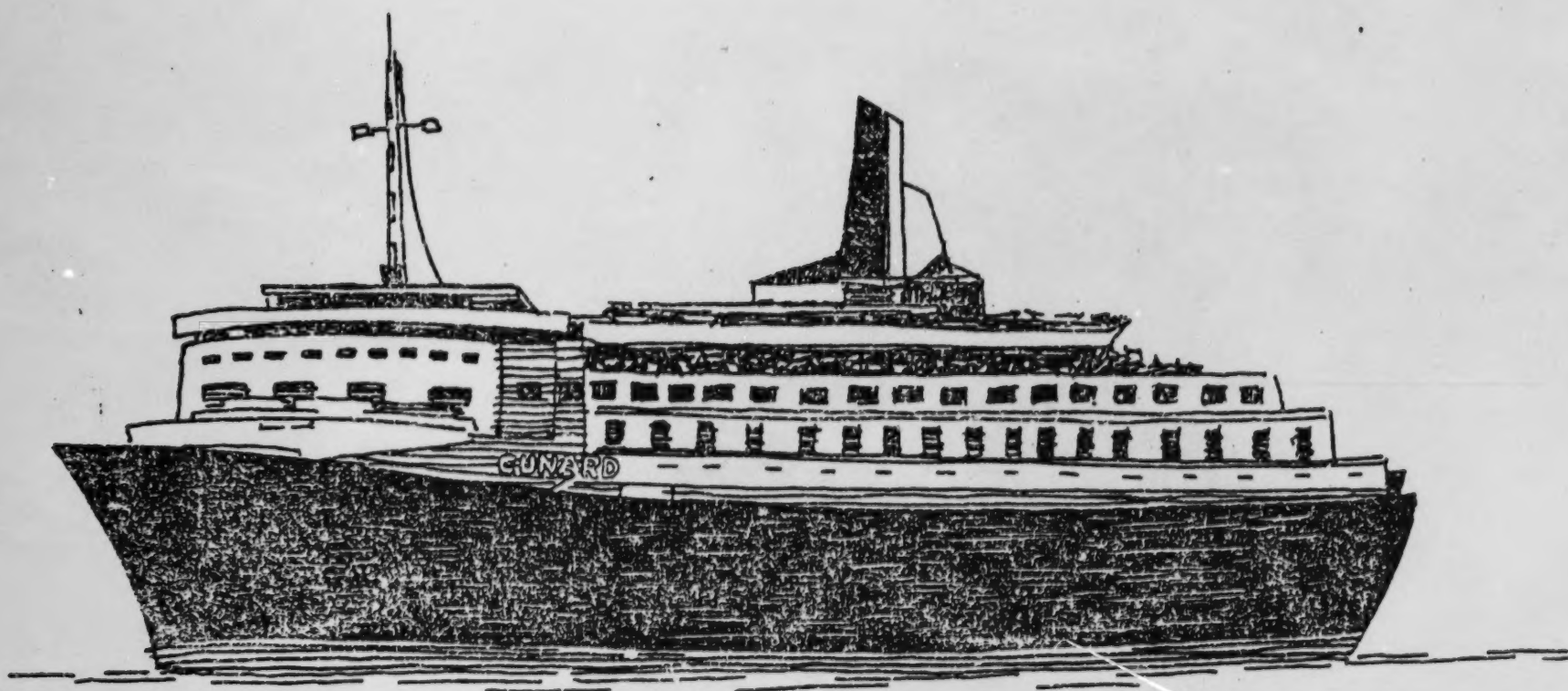
- 19b. Nuclear combat submarine traveling on surface.
- 20. "Trieste," deepest diving submersible. Capable of 8 mile dives.
- 21. "Heide Moran," typical modern diesel tugboat used in large port harbors.
- 22. Tug-barge combination in typical service in any U.S. port.
- 23. Motorized oil barge in Cape Cod Canal.

APPENDIX C

List of Figures

1. Ocean Liner - Queen Elizabeth II
2. Ocean Going Ferry
3. Harbor Ferry
4. General Cargo Freighter
5. General Cargo Freighter Interior
6. Bulk Loading Freighter
7. Container Ship Interior
8. L.A.S.H. Vessel
9. Super Tanker
10. Super Tanker Interior
11. Coast Guard Cutter
12. Tugboat
13. Fireboat
14. Ocean Trade Routes

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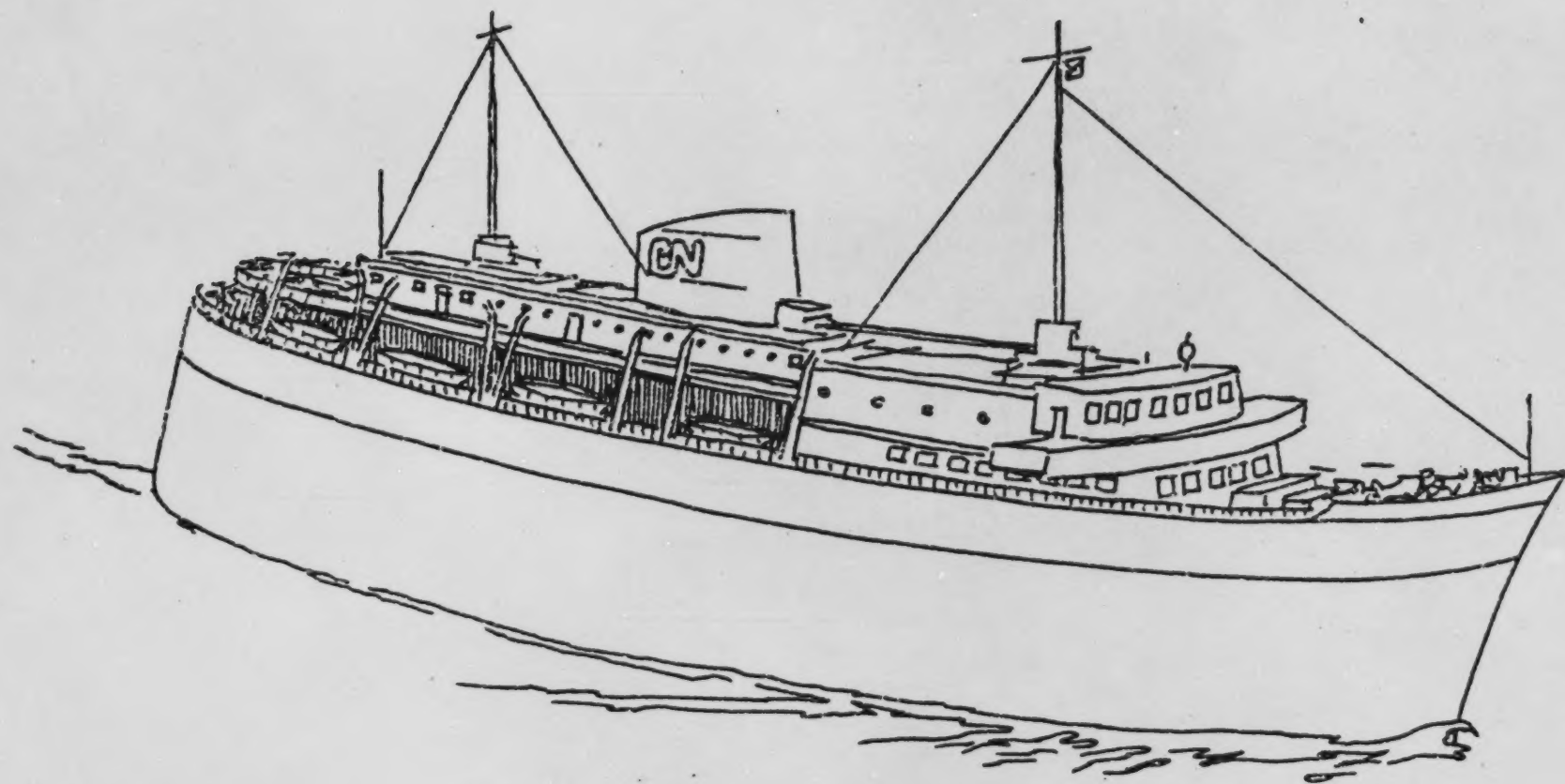


QUEEN ELIZABETH 2

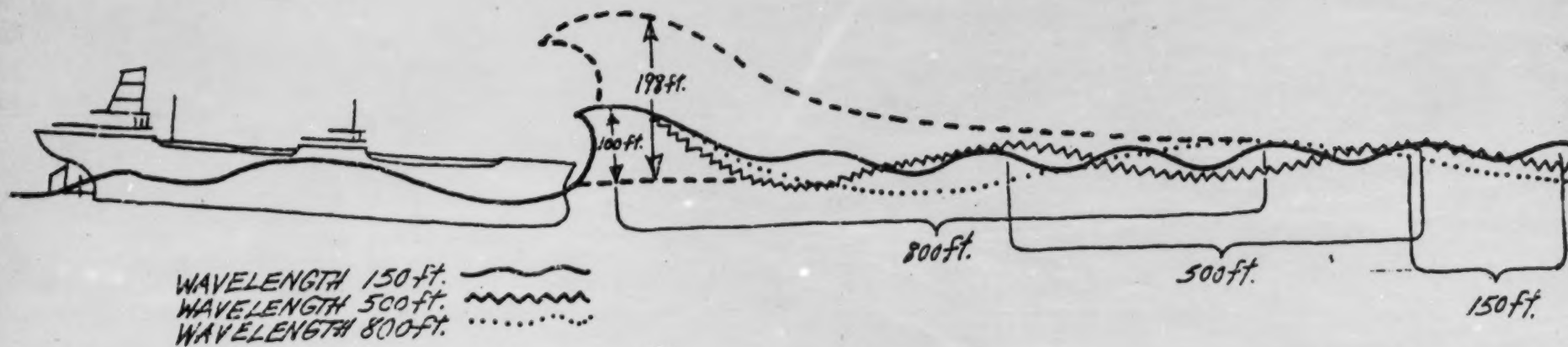
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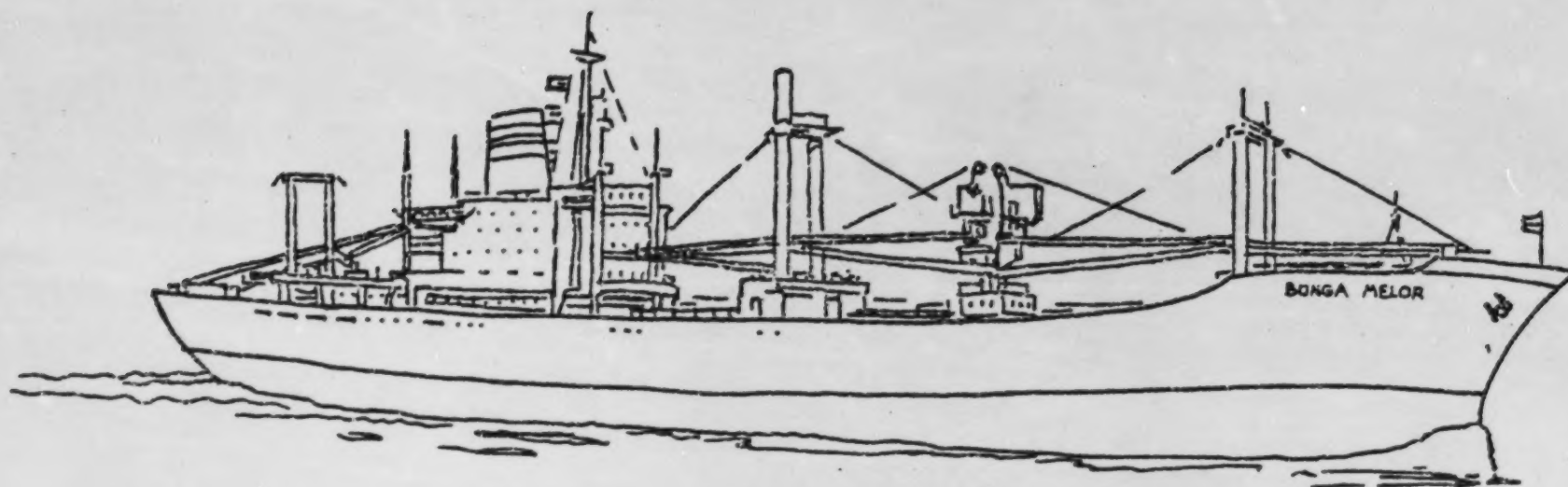
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OCEAN-GOING
FERRY

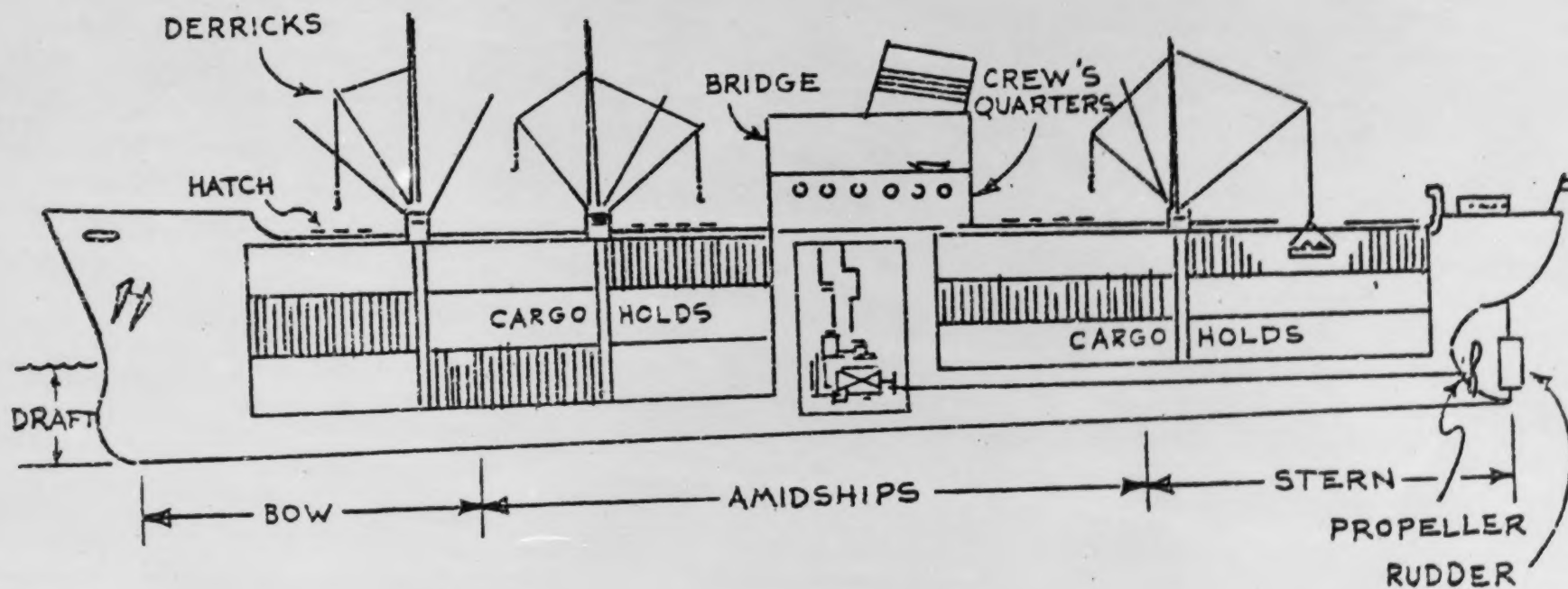




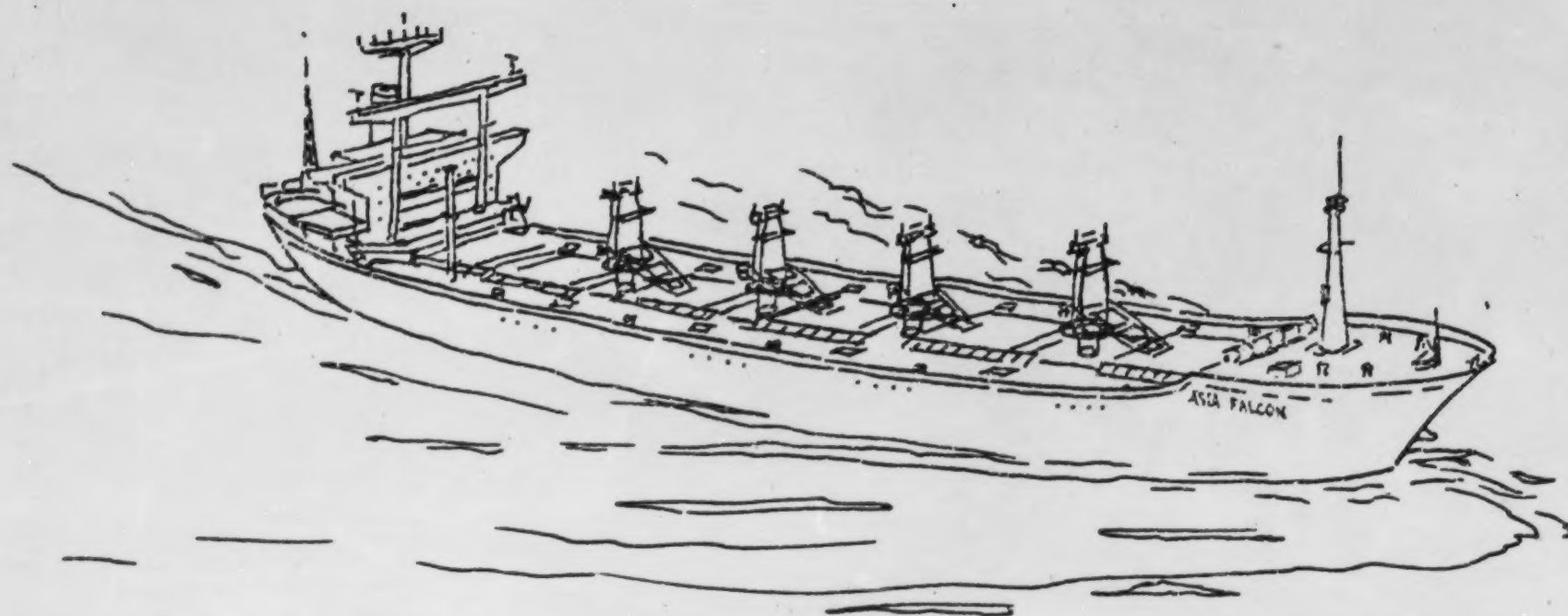


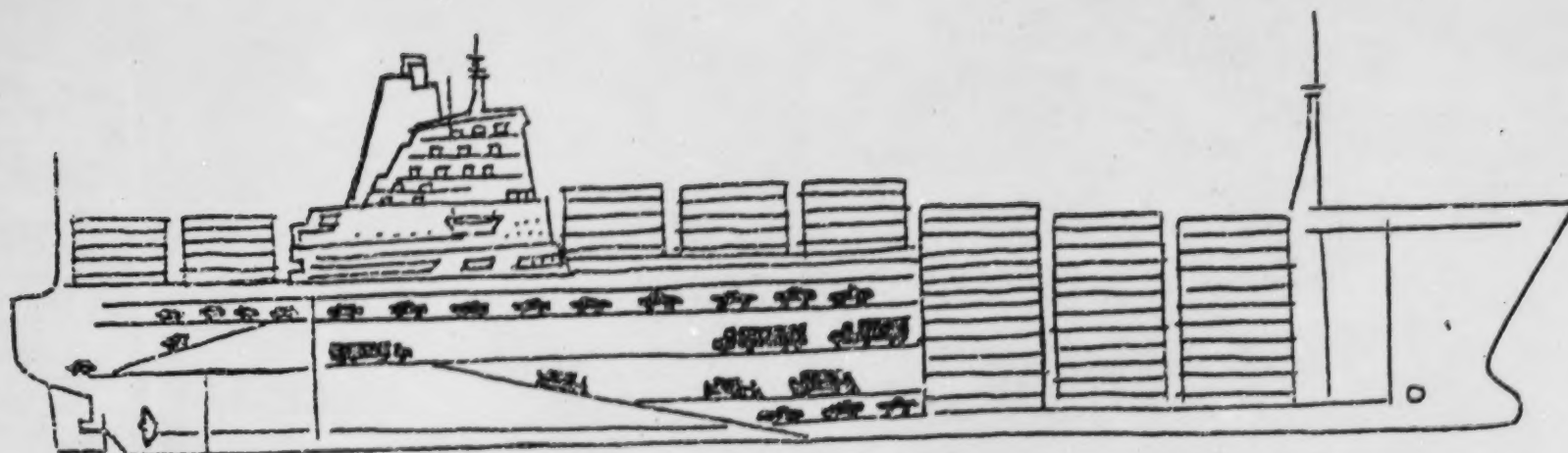
*GENERAL CARGO
FREIGHTER*

GENERAL CARGO FREIGHTER



BULK LOADING FREIGHTER



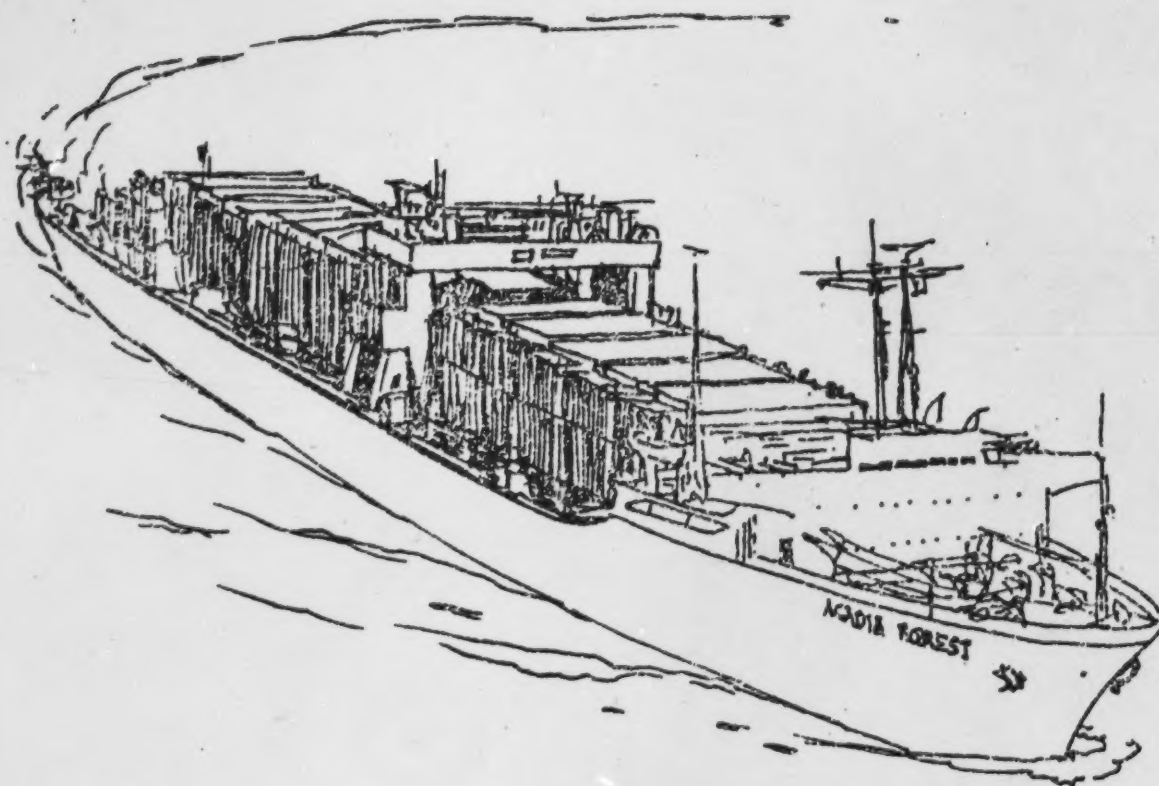


CONTAINER SHIP INTERIOR

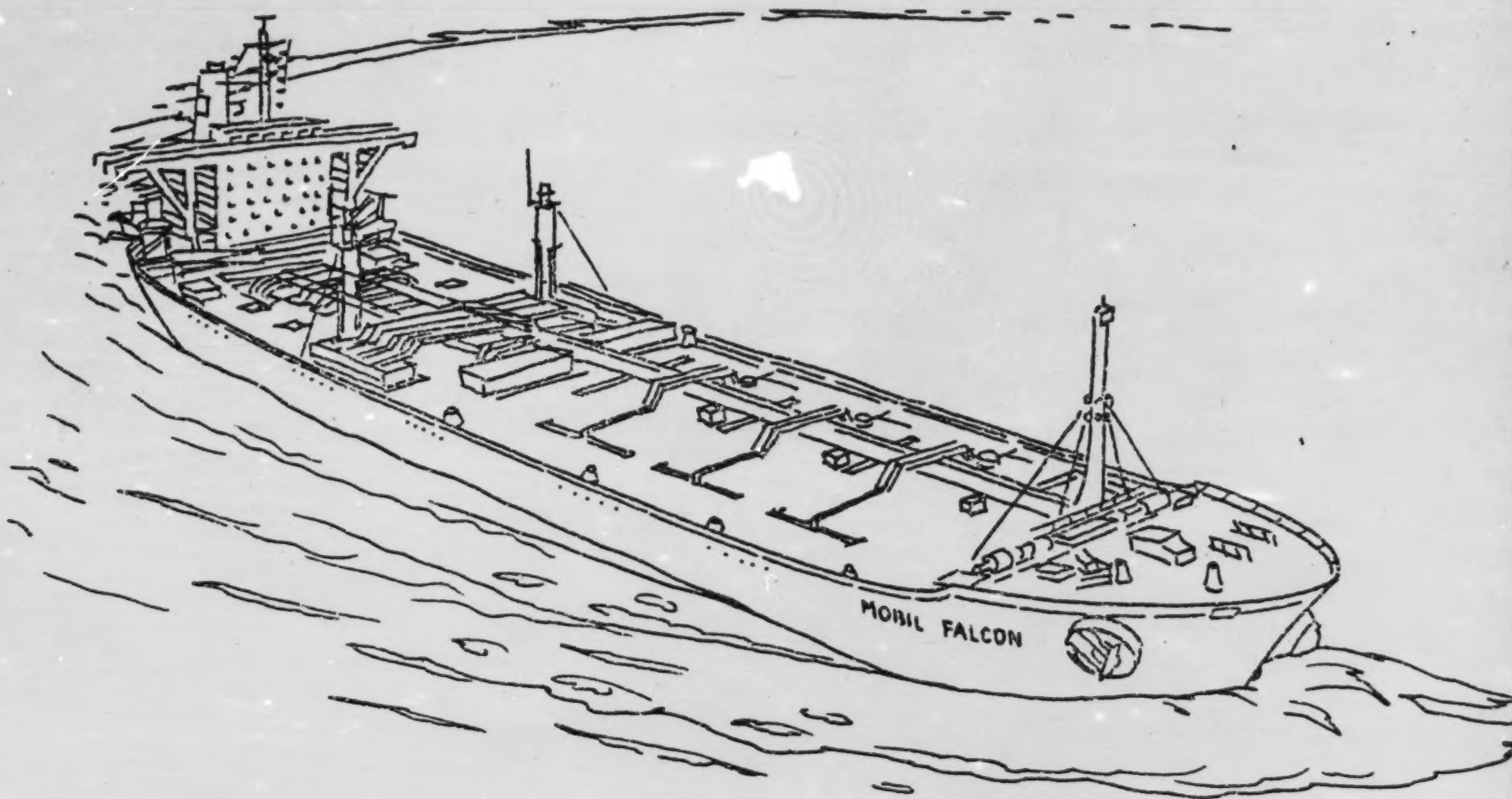
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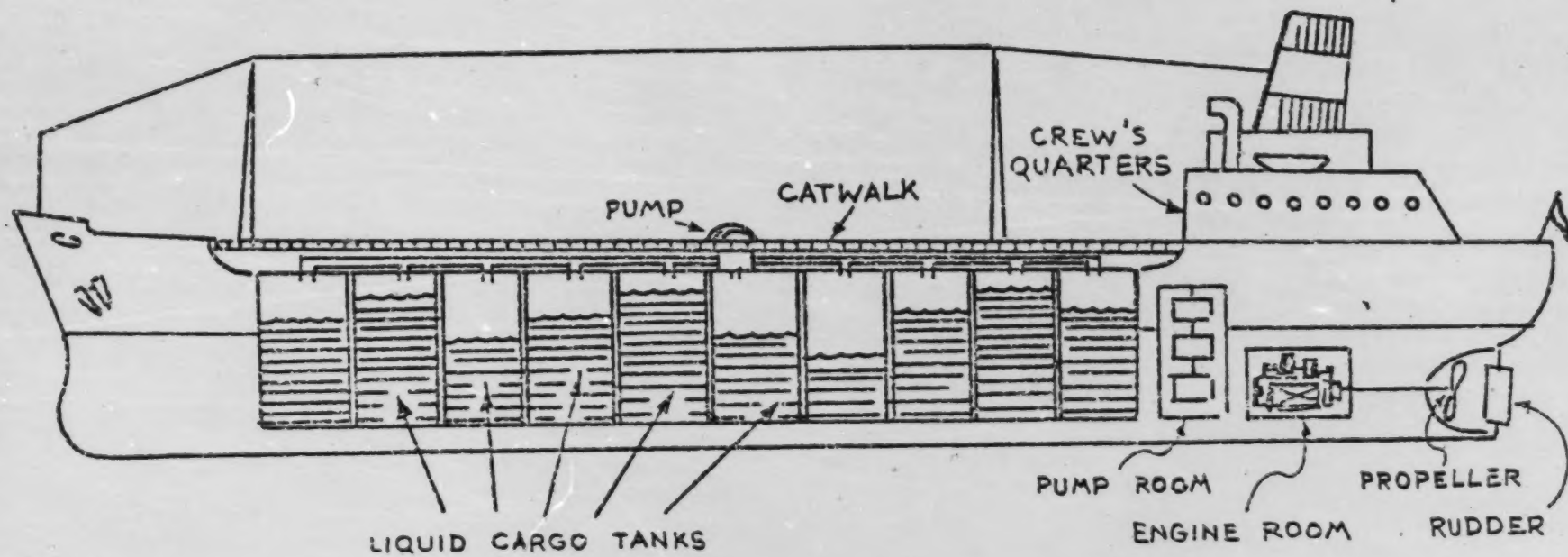


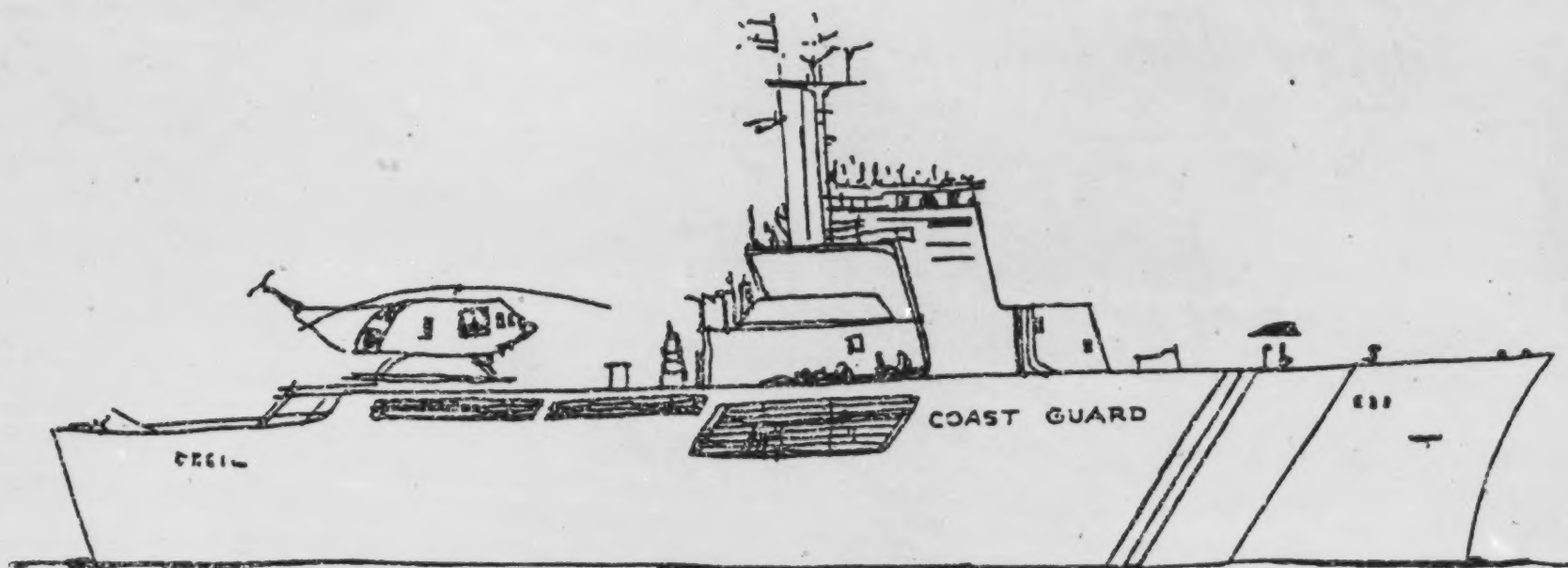
L.A.S.H. VESSEL



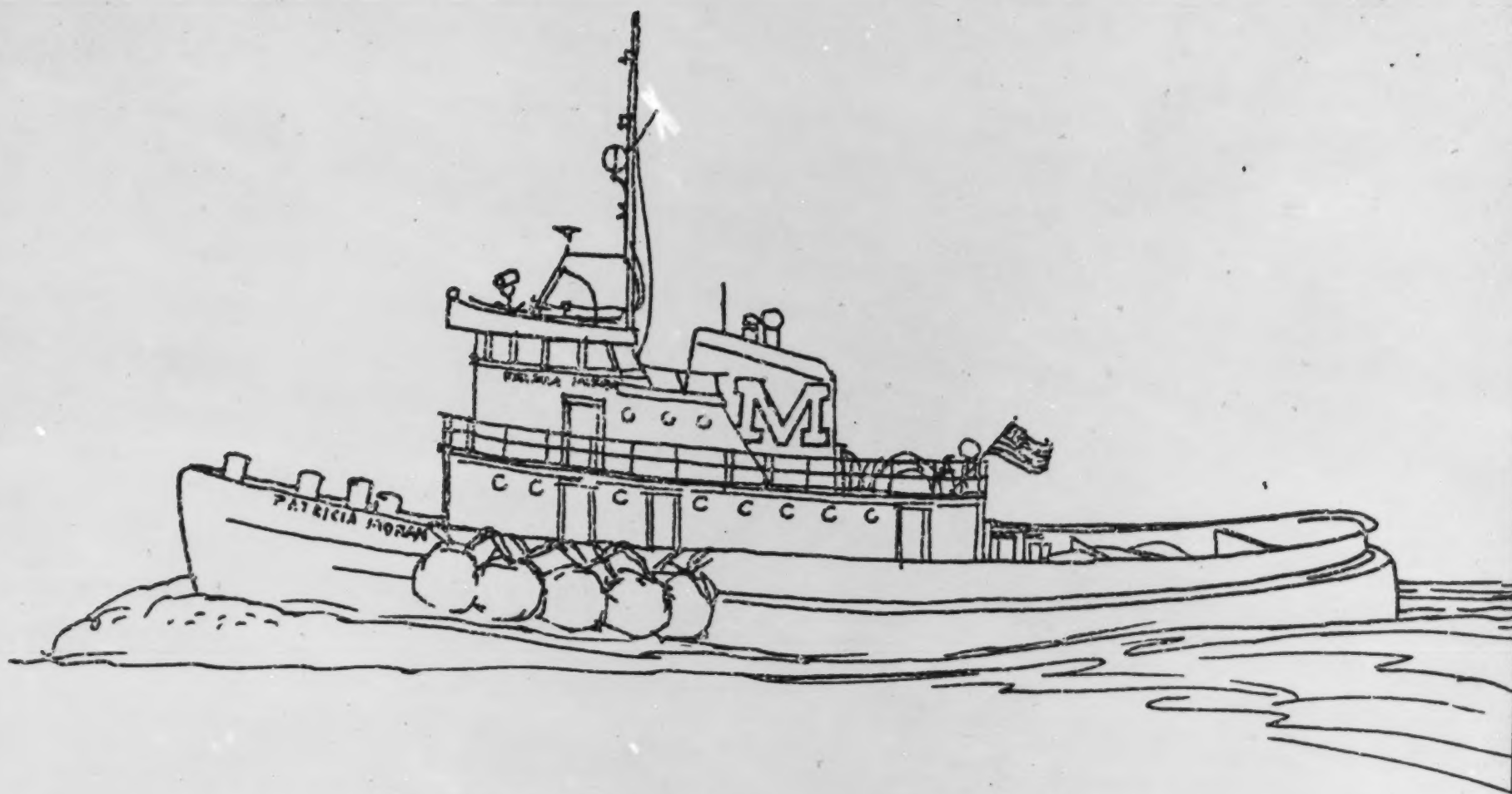
SUPER TANKER

SUPER TANKER





COAST GUARD CUTTER



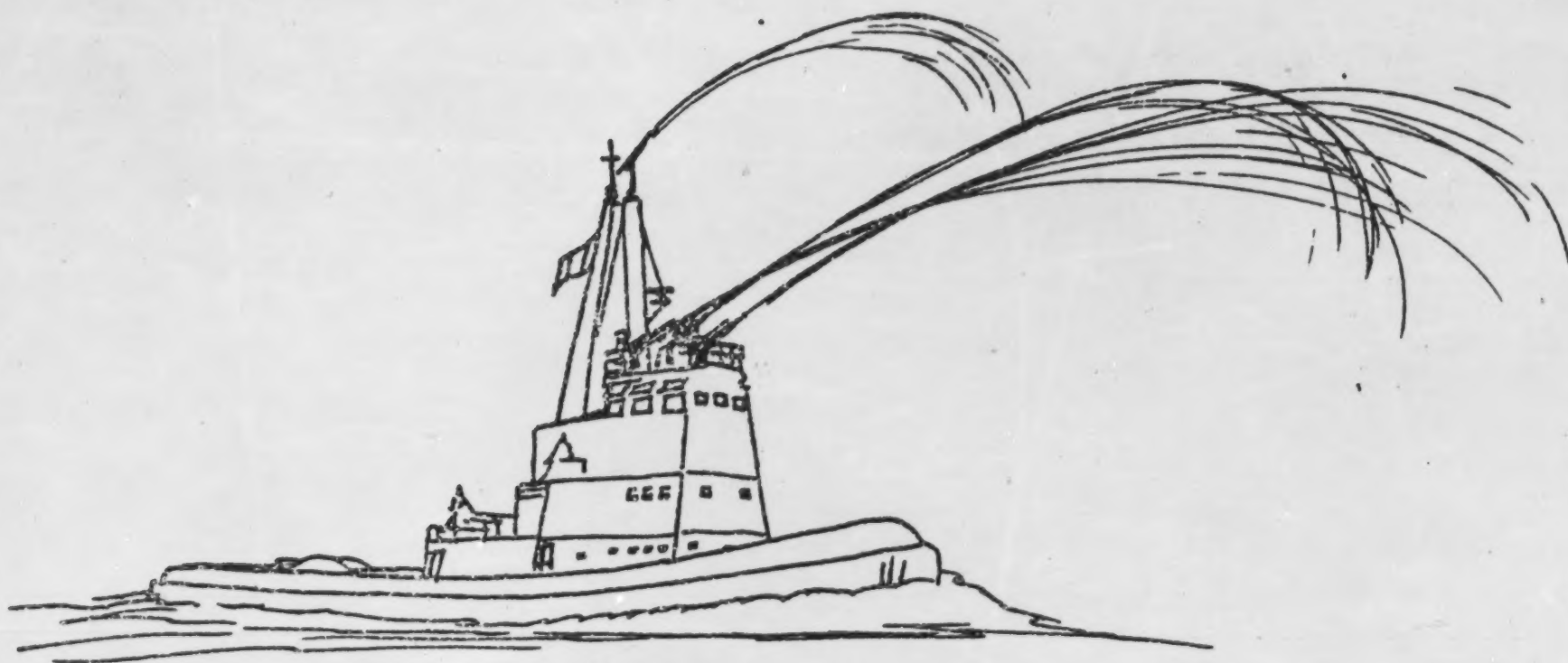
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TUGBOAT

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FIREBOAT

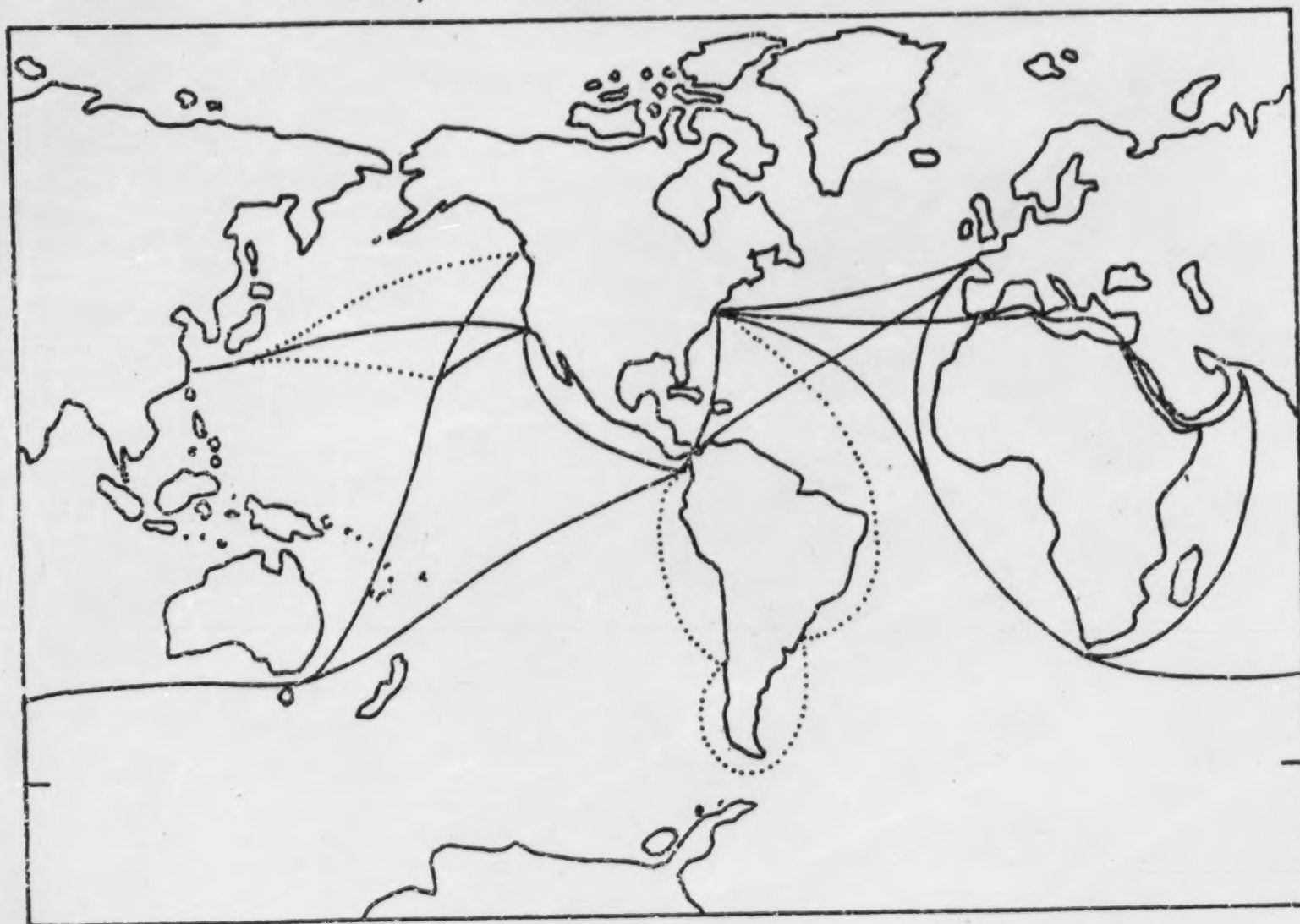
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OCEAN TRADE ROUTES

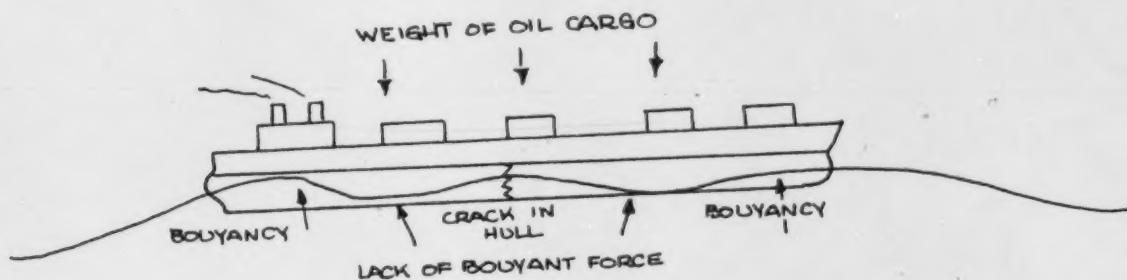


APPENDIX D

Science

Tanker-Wave Action

1. Project: Have children compare what happens to a 3M board and a 1 M board, each supported under the extreme ends by desks (representing ocean wave swells). Place a 1.5 kg weight in the center of the shorter board and a 3 kg weight in the center of the longer board. Which board bends the most? If they were hollow like ships' hulls, which would snap first under this same loading strain? Explain that this is what happens to tankers during storms and rough seas.



2. Project: Ballasting a ship. Free-form hulls (15 cm - 30 cm) made of aluminum foil can be placed in a large pan of water or small wading pool. Children may float their hulls in the water noting the amount of freeboard and the direction control of the vessel when pushed. The hulls can then be filled with ballast (either water, sand, etc.) to reduce freeboard and increase the vessels' weight. The hull will handle differently with this added weight. Real ships take on ballast to increase control and stability.

3. Project: Different oils have different weights. A clear, glass, graduated cylinder can be filled with small amounts (20 cc of each type) of oil. Heavier oils will sink to the bottom, while lighter oils will float on each other. Oils of different SAE's will work accordingly.

Casting Bottles into the Ocean to Study Currents

On a trip, the students might want to cast drift bottles overboard. Drift bottles are used to determine the direction and force of the tides. Although elementary school children are not ready for a comprehensive study of currents, it might be fun for them to see how far a bottle will go. To make drift bottles, have the students work in groups of four and prepare stamped, self-addressed postcards as shown below. Write on the card the date and place you expect to throw the bottle overboard. Number the cards.

#1 _____ School _____ Grade _____

This is part of a science project in our school. We are studying currents and tides. This drift bottle was cast overboard off

_____ on _____
(place) (date)

You can be part of our project by filling in the information asked for below and dropping the card in a mailbox. Please dispose of the bottle properly.

Where was the bottle found? _____

Date _____ THANK YOU

Place each card in a dry soft drink bottle. Cork and seal each bottle by dipping the cork end in warm paraffin several times to make it watertight. The paraffin should be carefully handled by the teacher

at all times and the directions on the box should be followed exactly. Never melt paraffin over a direct flame. A brightly colored tag tied to each bottle will help attract attention.

Sometimes the bottles are carried many miles before they are picked up. Hopefully, the finder will open the bottle and report back to the investigator. Ask the students what factors in addition to currents could cause the movement of the drift bottles. The answers might be wind, stormy seas, weeds catching them, man's interference, etc.

If you are unable to cast your bottle into an open area where it might become caught by the tide, ask a local fishing boat owner to drop the prepared bottles while out at sea several miles. Do not be disappointed with poor returns. It is very common to lose many or most of those bottles launched in this type of project.

Investigate Physics and the Sea

Challenge youngsters to make a lump of clay float in a tub of water. Through experiments with this, he/she will find that the same amount of clay which sinks as a ball, will float when shaped into a dish-like form. The teacher should explain that it isn't the air in the dish which makes the clay dish float, but the amount of water pushed away from the space now occupied by the clay. This is the theory of displacement. Youngsters can pursue this further by measuring the displacement of clay or aluminum foil boat hulls and also by determining how many grams of cargo will be supported by hulls of various shapes.

More activities of this sort can be found in the ESS units: Sink or Float and Clay Boats; available from the Webster Division, McGraw-Hill Book Company, New York.

APPENDIX E

"Edmund Fitzgerald"

1. Music Activity: Play a recording of "The Wreck of the Edmund Fitzgerald" by Gordon Lightfoot in class. Talk about the ballad form of music in class; how it tells a story and presents the contents methodically. This piece of music lingers and rolls as the story progresses. You can hear storm waves breaking and rising against the ship. How does this impart feeling to the lyrics of the song? Point out that after the ship sinks, the storm waves are no longer heard.

This is a true story. Share the reprint of the newspaper clipping with the students. The ship was a bulk freighter loaded with 26,000 tons of iron ore. Salvage people have never raised the hulk.

Read: Ships and Men of the Great Lakes by Dwight Boyer
Dodd, Mead & Company; New York, 1977.

Stories with photographs of the Great Lakes shipping disasters.

"Edmund Fitzgerald" well done, including photographs of the wreck on the bottom.

2. Collect Music Pertaining to Shipping: There are many folk songs which apply to the sea and some classical music as well. The classroom atmosphere may lend itself to the playing of "The Moldau," by Smetana; there are many recordings available. (Columbia MS6879 or ML6279)

From N.Y. Times, Nov. 12, 13, 1975.

SHIP LOST WITH 29 IN LAKE SUPERIOR

Lifeboats But No Survivors of Ore Carrier Found--Waves 20 Feet High by Agis Salpukas

SAULT STE. MARIE, Mich. Nov. 11 - A 729-foot ore carrier with 29 crewmen aboard sank last night in a storm in Lake Superior.

Condr. Charles Millradt, supervisor of the Coast Guard search, said today that the chances of finding any survivors from the craft, the Edmund Fitzgerald, were "pretty hopeless."

He said that the water temperature was about 50 degrees and that the most a person could survive would be from three to four hours unless he was able to get into a lifeboat.

"It's a small area," Commander Millradt said, glancing at a chart of Lake Superior in front of him at the Coast Guard Headquarters here. "We've combed it pretty thoroughly."

The Coast Guard reported finding lifeboats, liferings and other debris. It appeared to be the worst Great Lakes shipping disaster since Nov. 19, 1958 when 33 men from the freighter Carl D. Bradley were lost in Lake Michigan.

Commander Millradt told of the last contact between Capt. Ernest McSorley of the Fitzgerald and Capt. J. B. Cooper of the Arthur M. Anderson, another freighter that was following the Fitzgerald about 10 miles behind.

At about 7 last night, Captain McSorley reported waves of from 20 to 25 feet washing over the decks. He also said that water below decks was pouring through two broken tub shaped air vents.

He said that the ship was also beginning to list but did not indicate according to Commander Millradt, that he was "greatly alarmed."

No Radar Contact

At about 7:10 P.M. with northwest winds averaging 60 to 65 miles an hour and some gusts reading 75 miles an hour, Captain Cooper could not see the lights of the Fitzgerald. He checked the radar scope and found there was no contact. He tried to reach Captain McSorley on the radio but got no answer.

Bill Maki, who was on watch on the deck of the Anderson, said in an interview that winds were whipping snow over the ship and that waves of up to 30 feet high washed over the deck. He said that he lost sight of the Fitzgerald about 7 P.M.

When the weather had cleared at 7:30 P.M., Mr. Maki said there was no sign of the ship which was carrying 26,216 tons of taconite iron pellets bound for Detroit from Superior, Wis.

Captain Cooper estimated that the last known position of the Fitzgerald was about 14 miles southwest of Cooper Mine Point, Ont., and 15 miles northwest of Whitefish Point, Michigan, the point that the carrier was trying to round to get into Whitefish Bay where the waves and winds were less severe.

The water at this point is about 500 feet deep, Commander Millradt said.

The Coast Guard began a search last night with three ships, two helicopters, two small planes and two C-130 cargo planes, one of them from the Royal Canadian Air Force.

By late this afternoon, three lifeboats identified as belonging to the Fitzgerald had been found. All had drifted southeast of the normal path of the current here. The boats are self inflatable and their discovery did not necessarily indicate that they had been used by the crew members.

"Whenever we get tremendous Northwest winds in November," Commander Millradt said, "we get a major disaster."

The Anderson, which was also loaded with about 26,000 tons of taconite pellets, turned around at about 7:30 last night despite high winds and waves to search for the Fitzgerald.

Captains of other vessels who joined the search today expressed admiration for Captain Cooper and his crew for carrying out the search at great risk.

The Fitzgerald operated by the Columbia Steamship Division of Oglebay Norton Company of Cleveland, was launched in 1958 and was then the largest boat on the Great Lakes.

Captain McSorley, who had spent 44 of his 62 years on the Great Lakes was planning to retire Dec. 10, according to a stepdaughter, Delores Ulrich of Toledo.

THE WRECK OF THE EDMUND FITZGERALD

(Gordon Lightfoot, Summertime Dream, 1976 Warner Bros., MS2246)

(An account of the giant ore carrier Edmund Fitzgerald, which sank in Lake Superior in November, 1975).

The legend lives on from the Chippewa on down
of the big lake they called Gitche Gumee
The lake it is said never gives up her dead
when the skies of November turn gloomy
With a load of iron ore 26,000 tons more
than the Edmund Fitzgerald weighed empty
that good ship and true was a bone to be chewed
when the gales of November came early

The ship was the pride of the American side
comin' back from some mill in Wisconsin
As the big freighters go it was bigger than most
with a crew and good captain well seasoned
concluding some terms with a couple of steel firms
when they left fully loaded for Cleveland
and later that night when the ship's bell rang
could it be the north wind they'd bin feelin'

The wind in the wires made a tattletale sound
and a wave broke over the railing
and every man knew as the captain did too
'twas the witch of November come stealin'
The dawn came late and the breakfast had to wait
when the gales of November came slashin'
When afternoon came it was freezin' rain
in the face of a hurricane west wind

When suppertime came the old cook came on deck
sayin' "fellas it's too rough to feed ya"
At seven p.m. a main hatchway caved in
he said "fellas it's bin good to know ya"
The captain wired in he had water comin' in
and the good ship and crew was in peril
and later that night when 'is lights went out of sight
came the wreck of the Edmund Fitzgerald

Does anyone know where the love of God goes
when the waves turn the minutes to hours?
The searchers all say they'd have made Whitefish Bay
if they'd put fifteen more miles behind 'er
They might have split up or they might have capsized
they may have broke deep and took water
and all that remains is the faces and the names
of the wives and the sons and the daughters

The Wreck of the Edmund Fitzgerald

Lake Huron rolls Superior sings
in the rooms of her ice water mansion
Old Michigan steams like a young man's dreams
the islands and bays are for sportsmen
and further below Lake Ontario
takes in what Lake Erie can send her
and the iron boats go as the mariners all know
with the gales of November remembered

In a must old hall in Detroit they prayed
in the maritime sailors' cathedral
the church bell chimed 'til it rang 29 times
for each man on the Edmund Fitzgerald
The legend lives on from the Chippewa on down
of the big lake they called Gitche Gumee
Superior they said never gives up her dead
when the gales of November come early

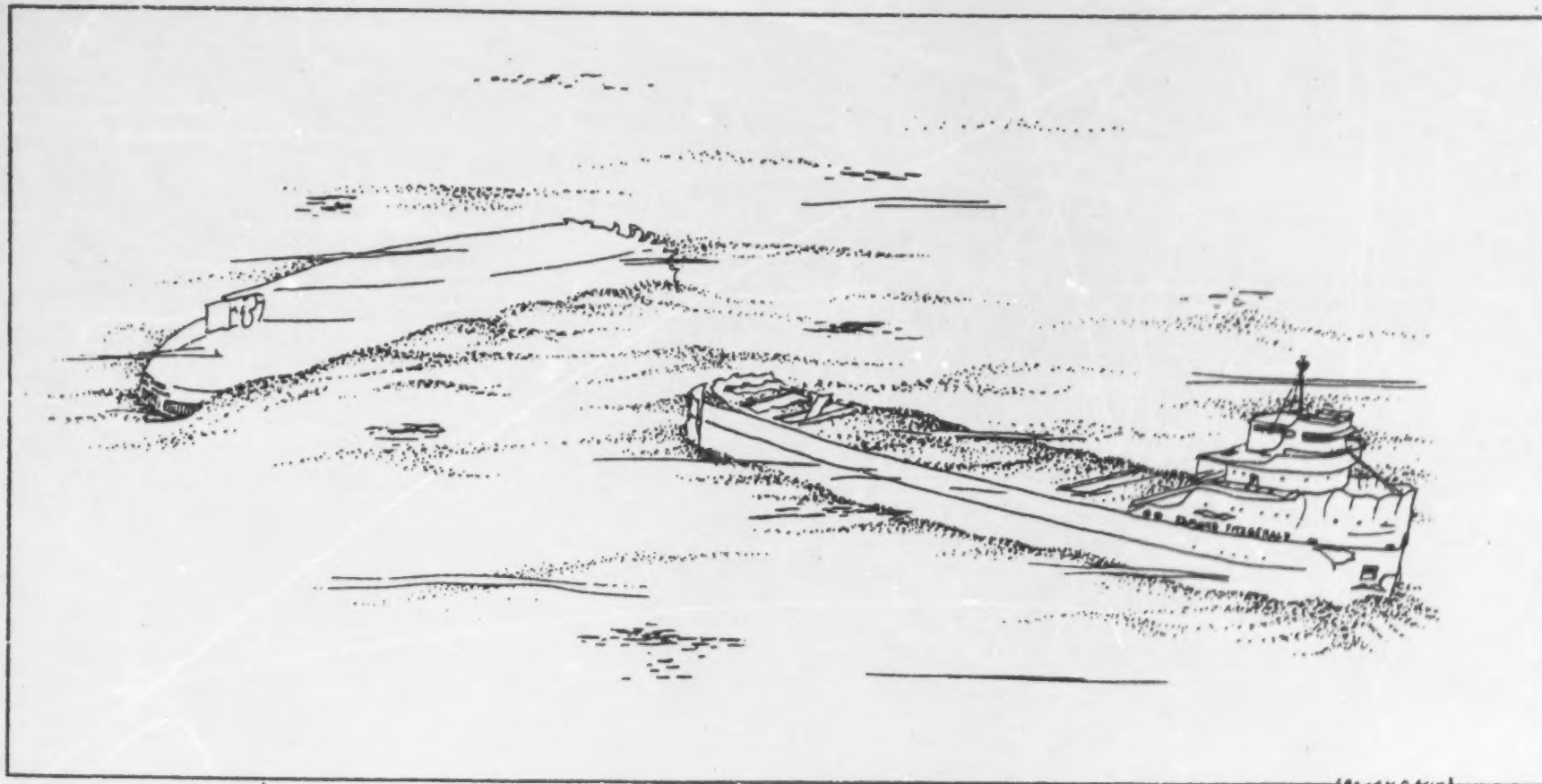


Figure F-1 the Edmund Fitzgerald as it appears on the bottom of Lake Superior
(Artist's conception based on Coast Guard Data)

APPENDIX F

Math Project

Have students utilize the degrees of a magnetic compass to "navigate" through a maze of chairs in the classroom. Individual degrees must be shown on the face of each compass. An example of the activity might be a series of directions reading: "Steer a course of 47° due Northeast for two meters, then correct to a course of 180° South for three meters, etc." If the teacher has planned this activity ahead of time, he or she may wish to hide some object at the end of the "voyage." This activity introduces the child to the compass, not only as a directional device, but as a circle with 360° radiating from the center.

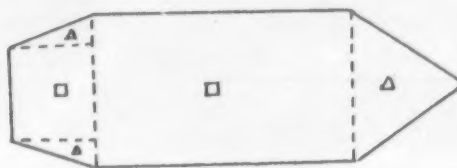
As an offshoot of the compass activity, children may wish to diagram certain vectors on a blank piece of paper using a protractor and a ruler. Instructions for the pattern of lines may either be dittoed in advance or dictated as a group project for the class by the teacher.

Figuring the area of canvas in a sail or the area of deck on a rough diagram of a boat may lend itself to use of geometric area formulae for rectangles and triangles. (See below)

$$A = \frac{1}{2}bh$$



$$\Delta = \frac{1}{2}bh$$



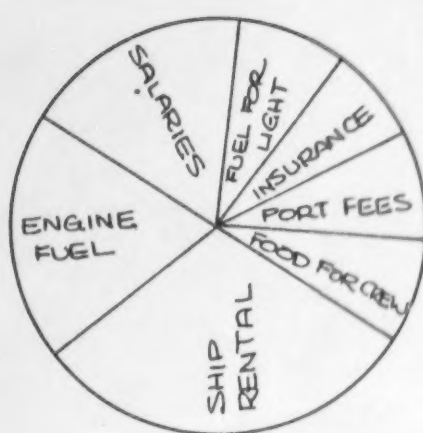
$$\square = l \times h$$

Two N.C.T.M. films for students are available from the Instructional Systems Center of the University of Maine at Orono, which pertain to maritime influence.

Order: S10 Hidden Treasure - Three treasure hunters each follow a different map to the same destination.

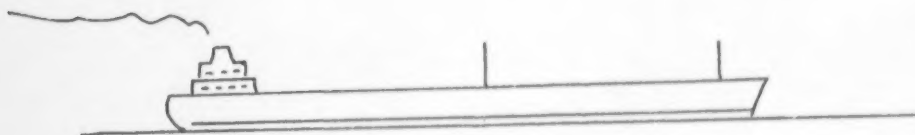
S12B Solving Pairs of Equations - A young crewman on a pirate ship must walk the plank unless he recovers the treasure lost in a sea battle. He finds the loot by determining the point where the two ship's paths intersected.

Operating a Super-Tanker



Total Costs: \$840,200

1. On which item was the most money spent?
Which two items cost the next most?
2. Which fraction was provided for insurance?
3. Which item uses $\frac{1}{3}$ of the total funds?
How many 12ths is that fraction?
4. How much money is required for salaries?
5. How much money is required for total fuel expenses?
6. What is the difference between fuel for engines and port fees?
7. If it costs \$840,200 to operate a tanker, and the ship earns \$1,450,000 per voyage, what is the net profit per voyage?
8. How much money does it cost to rent a super-tanker?



You may use a calculator for this exercise, if you have one.

APPENDIX G

Language Arts Projects

Nautical Terms:

Aft:	toward the rear or stern of the ship
Amidships:	the middle section of the ship
Bathysphere:	deep diving submarine used to explore deepest ocean areas
Bouy:	floating marker in a waterway which indicates position, depth, speed or vessel restrictions
Bow:	the front part of the ship
Bridge:	the highest room or section of rooms on a ship from which the ship is steered
Derricks:	the cranes on a cargo ship used to load and unload goods
Draft:	the distance between the bottom of the ship and the waterline (varies depending on whether the ship is loaded or not)
Fore or Forward:	toward the front, or bow, of the ship
Hatch:	openings in deck for loading cargo
Helm:	the steering system of the ship
Hold:	the place on a ship where any cargo is carried
Port:	the left side of the ship when facing forward
Propeller:	rotating blades under stern of vessel which push the ship
Rudder:	directional blade which controls the course of the ship
Starboard:	the right side of the ship when facing forward
Stern:	the rear part of the ship

Name _____				
Word to look up	Page word is found	Definition of word	Guide words on that page	Put words in alphabetical order
Aft				1.
Stern				2.
Helm				3.
Bow				4.
Starboard				5.
Derricks				6.
Hold				7.
Fore				8.
Amidships				9.
Draft				10.
Bridge				11.
Port				12.

After using the spelling list activity have children designate a location for as many of the terms as can be applied to oil tanker sketches (Figures 9 and 10), provided in this unit. A partially completed picture can be found in Figure 5, the General Cargo Freighter.

Letter Writing

Objective: To give the students practice in writing letters and using the correct form of a letter.

Materials: Copies of the handout on page 88
Paper and pencil
Envelopes (optional)

Procedure: Make copies of the handout on page 88. Give each student a copy. Explain to the class that this is the correct form of a business letter. Tell them about the different parts of a letter and that the boxes indicate where capital letters go. Ask the class to use this form to write a letter to the captain of any one of the ships studied in the "Ships and Seaways" unit: Passenger Ship, Oil Tanker, Ferry Boat, Cargo Ship, Tugboat, etc. In the letters the students should ask if they could become a crew member aboard the ship. They must explain in the letter:

1. Why they want to work on that particular type of ship.
2. The work they would do aboard.
3. Some past experience they have had with ships or the water.
4. Why they would be good sailors.

The letter may be written directly on the handout or on regular paper with the handout used simply as a reference.

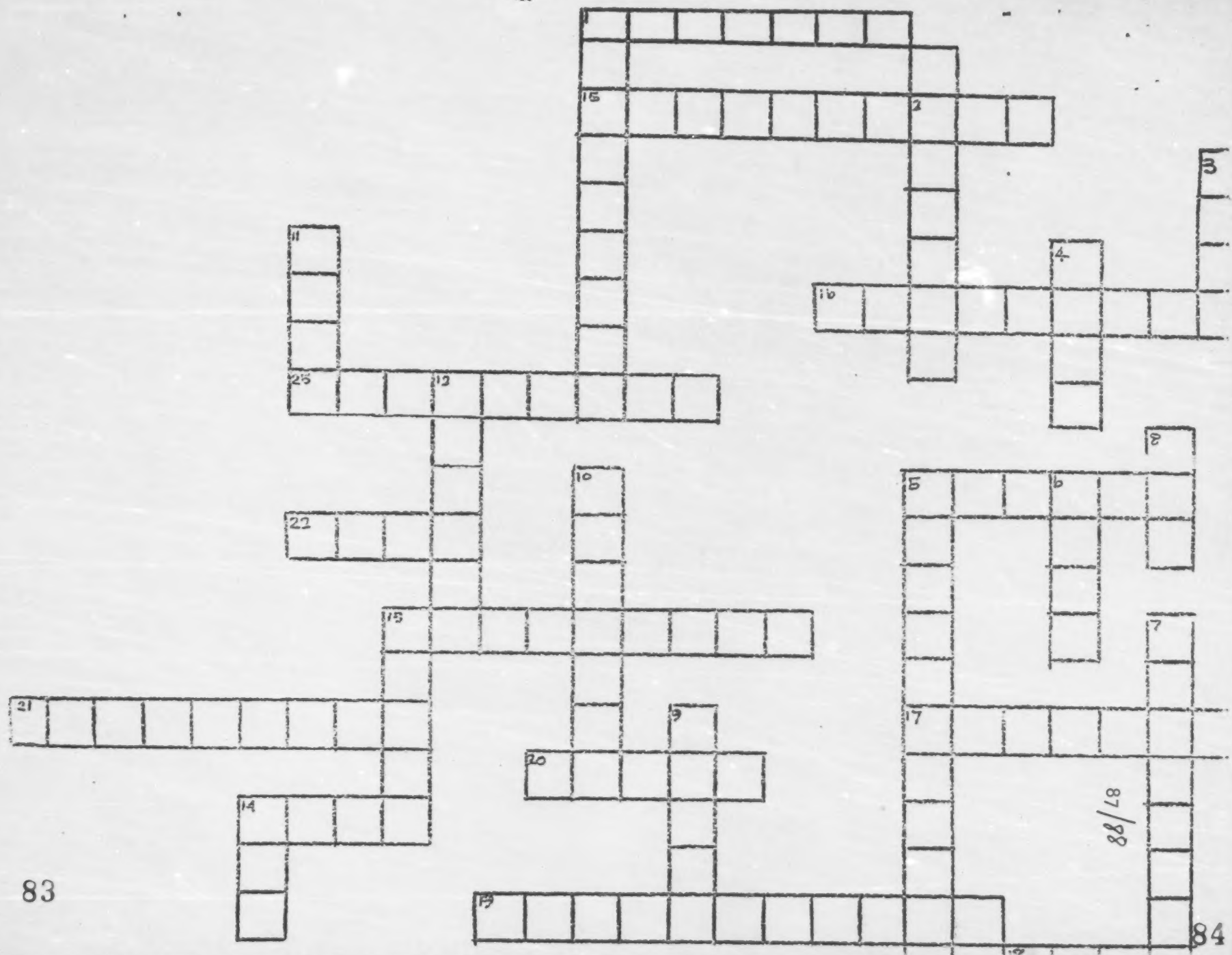
Ships and Waterways Crossword Puzzle

Down

1. Effect of an oil spill
2. Power of atomic submarine
3. Ship's cargo space
4. City of arrival; leftside of a ship
5. Deep, deep diving research submarine
6. Floor or a ship
7. Extinguishes burning ships
8. "She's a Queen!" Last trans-Atlantic liner (initials)
9. Hull depth underwater
10. "Muscle" boat of the harbor
11. Very Large Crude Carrier
12. Ship for petroleum products
13. Moves people, autos short distances on water

Across

1. Western Ocean of North America
5. Room containing ship's controls, wheel
14. Marker at sea
15. "Silent sentinel" - marking reefs and rocks
16. The right side of a ship
17. Undersea military ship
18. Unit of speed measure at sea
19. Enforces U.S. laws and saves lives at sea
20. Rear end of a ship
21. Turning blades which push a ship
22. Loose cargo (like grain) dumped into a freighter
23. Eastern Ocean of North America
24. Lighter Aboard Ship
25. Cargo in truck bodies



87/88

Student's Address

(Date)

(Inside Address)

Dear
(Greeting)

(Body)

(Closing)

☐ _____

☐ _____

ADOPT-A-SHIP PLAN
send now for next year

FOR SKIPPERS AND SCHOLARS

The ADOPT-A-SHIP Plan dates from the same period as the Merchant Marine Act of 1936. First introduced through the Propeller Club of the United States, it was turned over to the Women's Organization for the American Merchant Marine in 1937. The Propeller Club now again sponsors and administers the Plan, as it has since 1958. The Plan provides the opportunity for a school to "adopt" a ship of the American Merchant Marine and exchange correspondence with it.

The purpose of the Plan is to teach Young America, the citizens of tomorrow, the need for adequate American Merchant Marine for domestic and foreign operations. The term "Merchant Marine" embraces not only the fleets of ocean and coastal vessels, but those on navigable rivers, lakes, bays and sounds, as well as harbor craft.

In addition to patriotic implications, the Plan fosters interest in geography, history, transportation, foreign and domestic trade, and English. It affords children an outlet for natural interest in the sea and teaches them something of the staunch character of the men of the American Merchant Marine.

Our first step in the ADOPT-A-SHIP Plan is to contact the steamship companies active in the American Merchant Marine to obtain permission to request cooperation of their captains. The captain of each ship is then approached. If he has sufficient interest in the Plan to assume a responsibility for answering the correspondence from a school personally or through his officers or crew members, his ship is "adopted" by a school listed with the Propeller Club Headquarters. It is left to the discretion of the captain whether or not other ship's personnel take part in the plan. Where a student letter pertains to a particular department, it is quite generally answered by those in charge of the department. However, all correspondence from the ship should be supervised and signed by the captain and sent to pupils in care of the teacher who is responsible for the school project.

Names of schools are obtained through the publicity the Plan has inspired. Teachers and pupils must write us of their interest and ask for a ship. No individual pupil is allowed to "adopt" a ship. A request must originate with a teacher. Classes eligible to participate in this Plan range from the fifth through eighth grade school level. When a teacher writes for a ship adoption, the following information Must be included for our records.

Name and address of school
Classroom grade number
Number pupils in class
Subject (or subjects) to be associated with
the correspondence in classroom study

Correspondence from the school must begin immediately after a ship is assigned. The teacher must supervise class correspondence and develop this project to the greatest extent possible in classroom work.

The first letter from a teacher to a ship's Captain should request information regarding the ship's itinerary and the best means of communications. The first letter from the class usually contains questions pertaining to size of the ship, number of crew, trade routes, cargo carried, imports and exports, etc. With correspondence fully launched, student questions arise automatically and with alacrity. Geography, social sciences, and other subjects take on a freshness not readily attained by textbook studies alone. One designated student may, if the teacher wishes, write the letters to the adopted ship, incorporating all class questions. However, it is also possible (and is quite generally done) for each student to write his own questions to the Captain. In any case, correspondence must be supervised by the teacher and duplicate questions eliminated. All correspondence must be enclosed in ONE PACKET with a covering letter from the teacher and forwarded to the ship every four to six weeks. Period of correspondence will run from September to following May 15.

THE PROPELLER CLUB OF THE UNITED STATES ADOPT-A-SHIP PLAN

Programs similar to this are also conducted in other countries, England and Norway for instance. In these countries all ships of the merchant marines concerned are enrolled in programs through governmental official sponsorship.

The Propeller Club of the United States

Headquarters
1730 M Street, N.W. Suite 413
Washington, D.C. 20036
(202) 223-1401

ADOPT - A - SHIP PLAN

APPLICATION FOR CLASS PARTICIPATION

(Please type or print)

Name of Teacher _____

Name of School _____

Address _____

(Street and Number)

(Post Office Box)

(City and State)

(Zip Code)

Grade _____

Number of pupils in class _____

Subjects _____

(That which associates the correspondence in classroom study, e.g., Geography, History, Social Science, etc.)

Fall School Term Begins _____

School Closes for Summer _____

You first learned of the Adopt-A-Ship Plan through _____

Have you ever participated in Plan previously? YES _____ NO _____

When? _____ For how many years? _____

Date _____, 197____.

(Signature of Teacher)

WAITING LIST

Appendix D
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